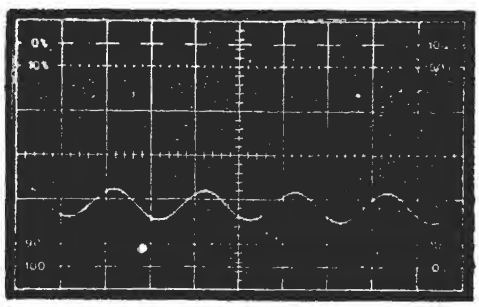
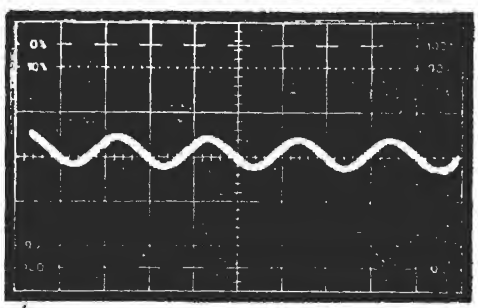
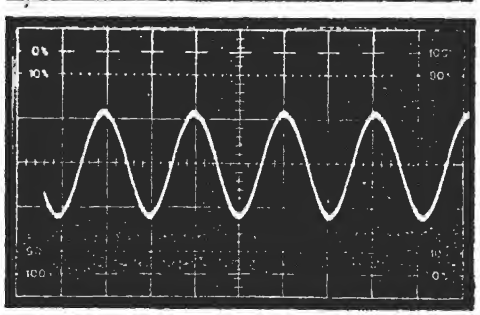
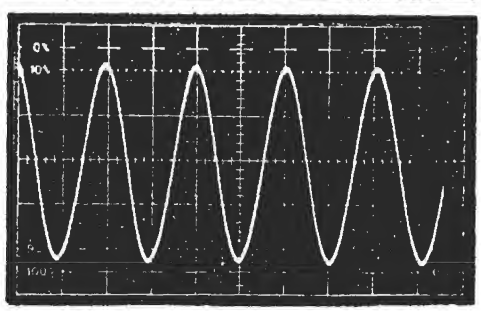
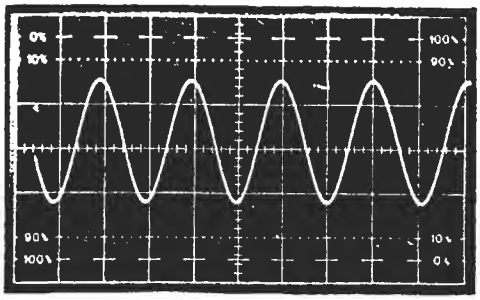
Waveforms for AD1 and AD2

TF 2370 controls - SWEEP MODE : AUTO
FILTER BANDWIDTH : NORMAL
VERTICAL SCALE RANGE : 10 dB/DIV

Feed a 100 kHz 33 mV p-p signal to pin 32 on AD1 with the wire to this pin disconnected.

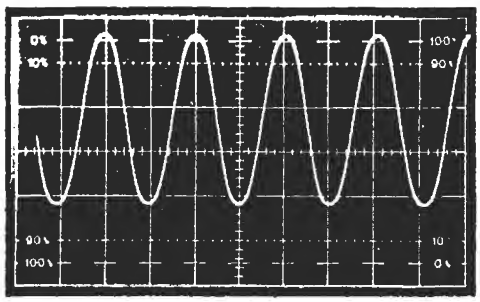
Horizontal scale	*Vertical scale*	*Datum level*	
5 μs/div	50 mV/div	4 V →	 1
5 μs/div	50 mV/div	4 V →	 2
5 μs/div	50 mV/div	4 V →	 3
5 μs/div	0.1 V/div	4 V →	 4

5 μs/div 0.5 V/div 4 V →



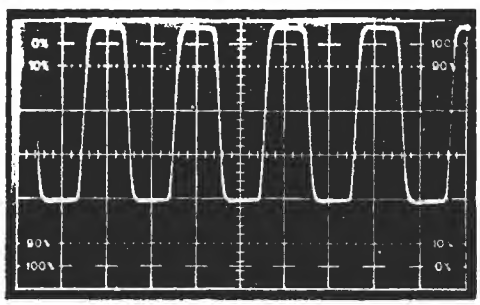
5

5 μs/div 1 V/div 4 V →



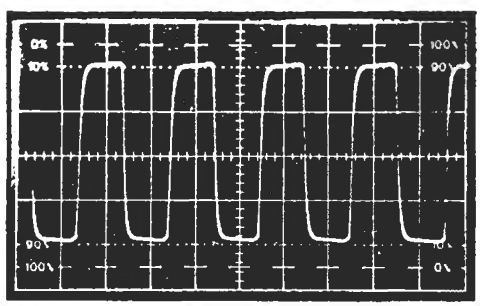
6

5 μs/div 1 V/div 4 V →



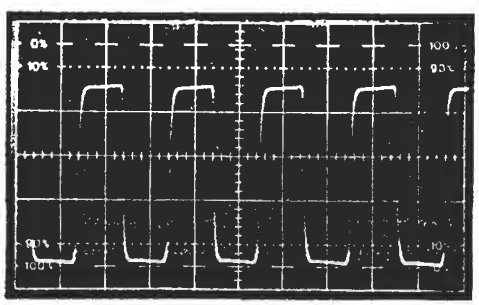
7

5 μs/div 1 V/div 4 V →



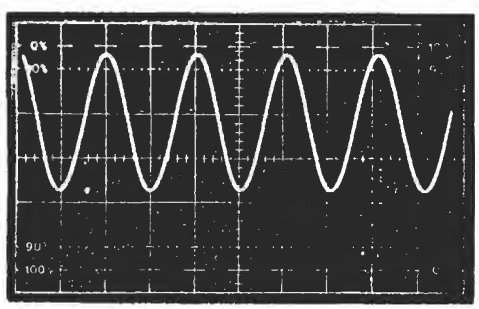
8

5 μs/div 1 V/div 4 V →



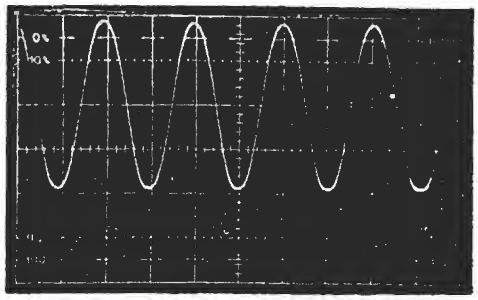
9

5 μs/div 1 V/div 4 V →



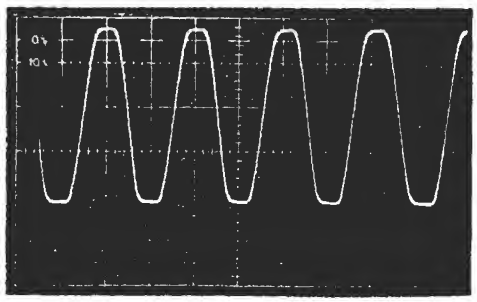
10

5 µs/div 1 V/div 4 V →



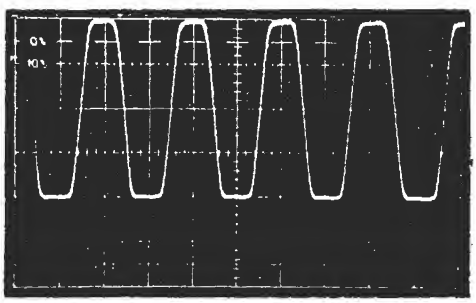
11

5 µs/div 1 V/div 4 V →



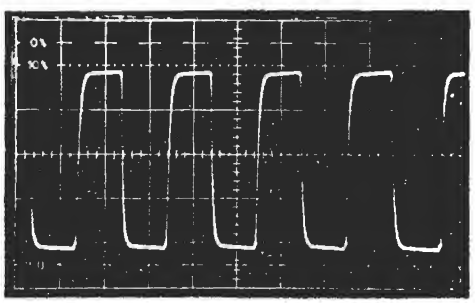
12

5 µs/div 1 V/div 4 V →



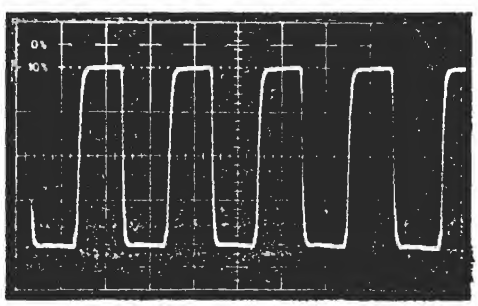
13

5 µs/div 1 V/div 4 V →



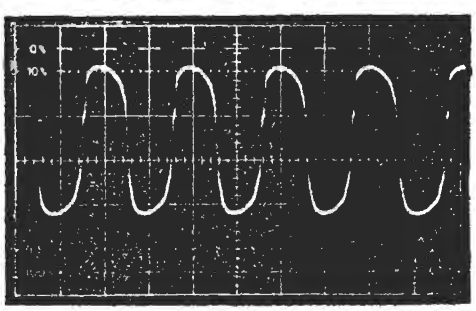
14

5 µs/div 1 V/div 4 V →

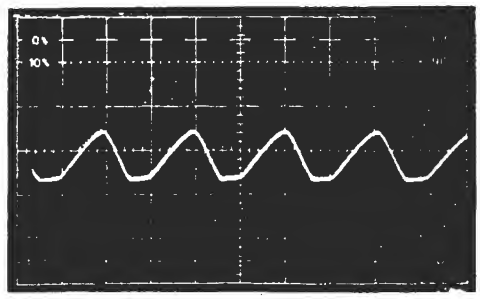


15

5 µs/div 0.5 V/div 3 V →

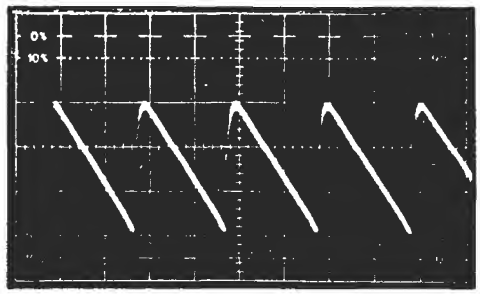


16



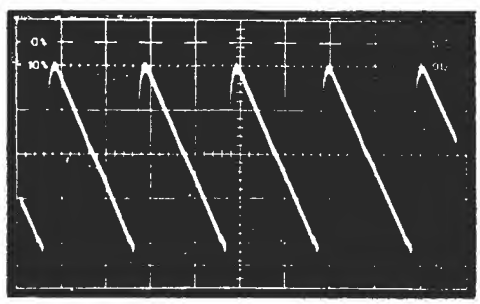
17

5 μs/div 50 mV/div 0 V →



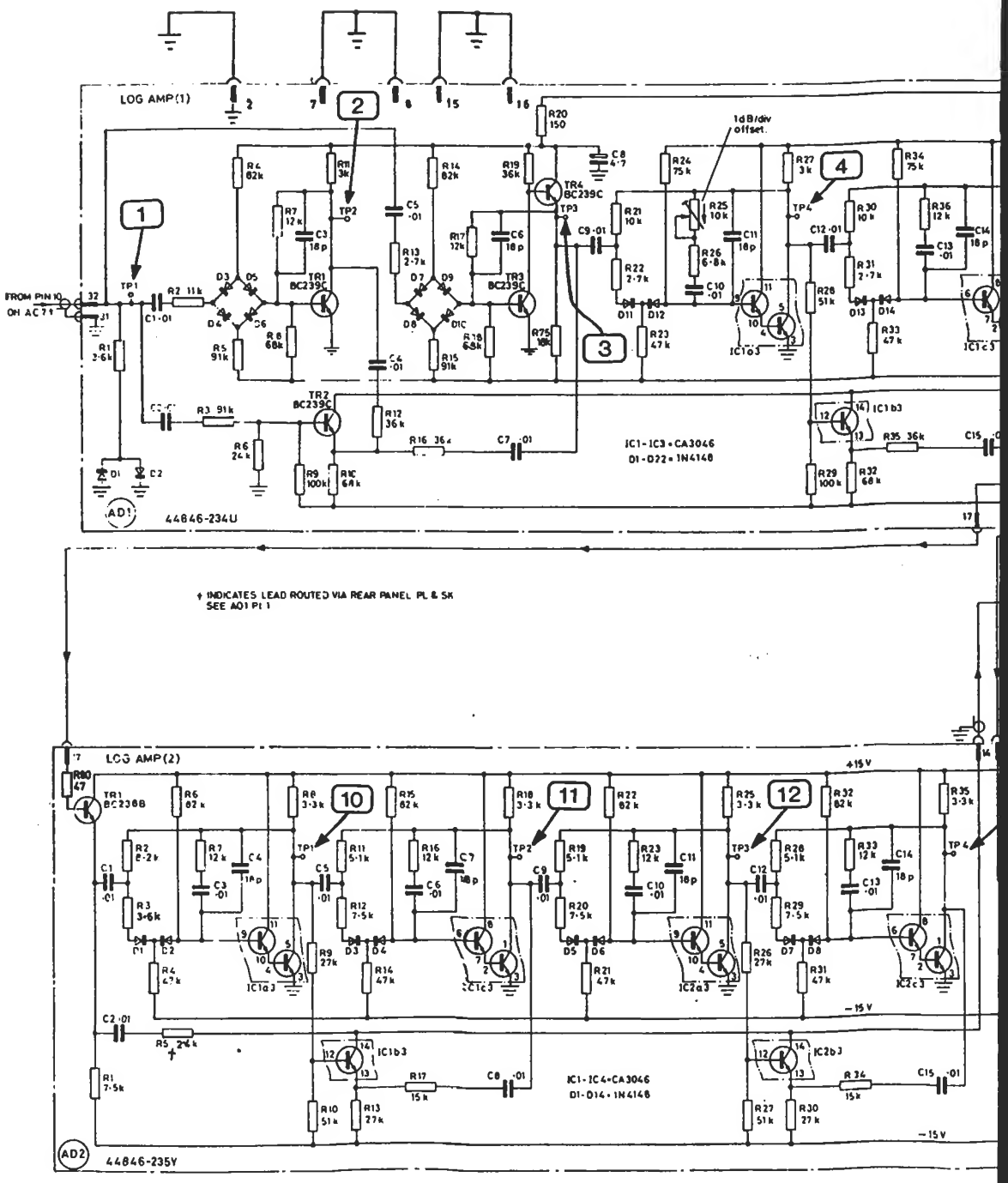
18

5 μs/div 50 mV/div 0.9 V →



19

5 μs/div 50 mV/div 1.2 V →



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AD 2

77 76 75

64

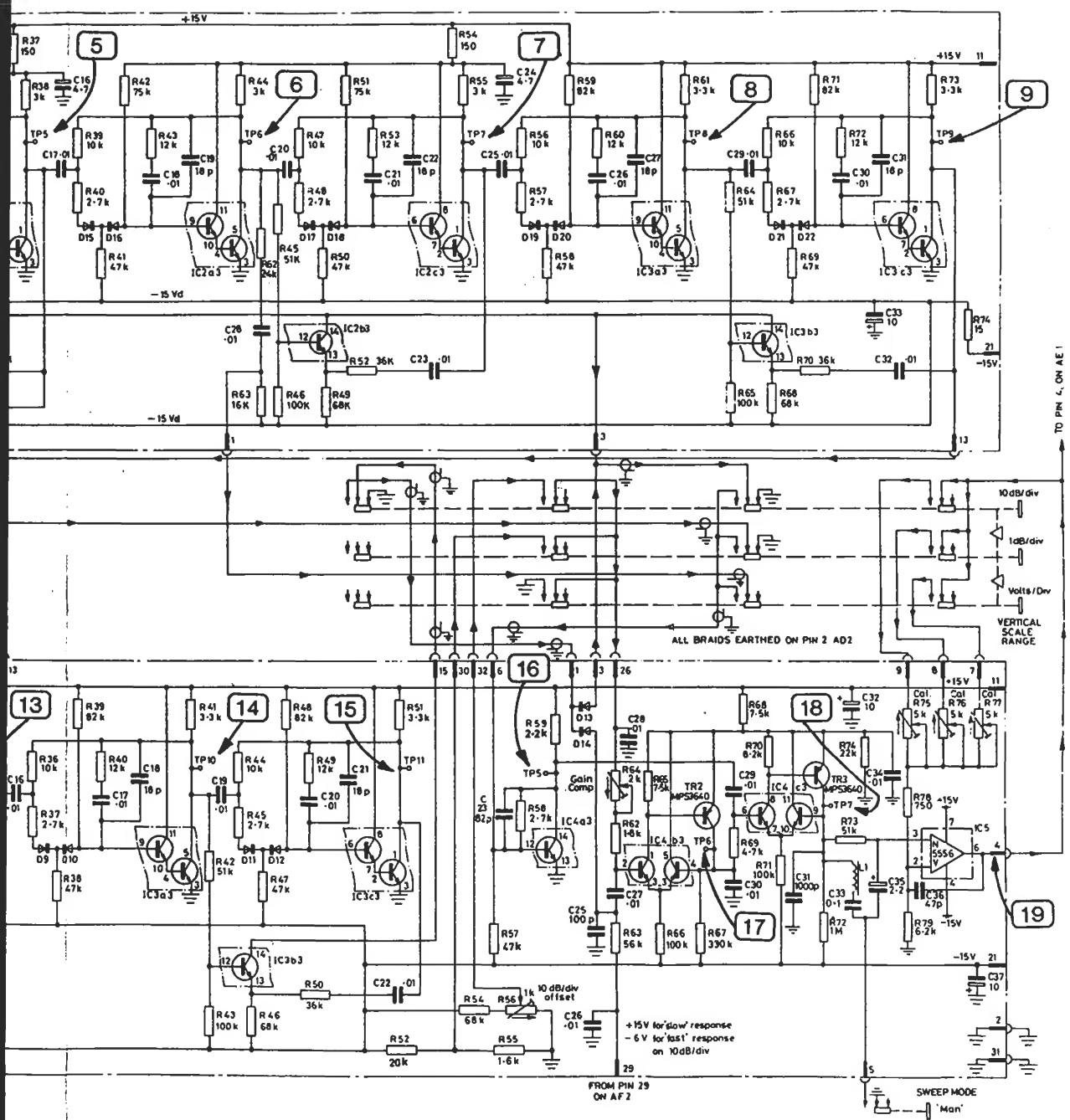


Fig. 7.18 Logarithmic amplifier AD1 and AD2

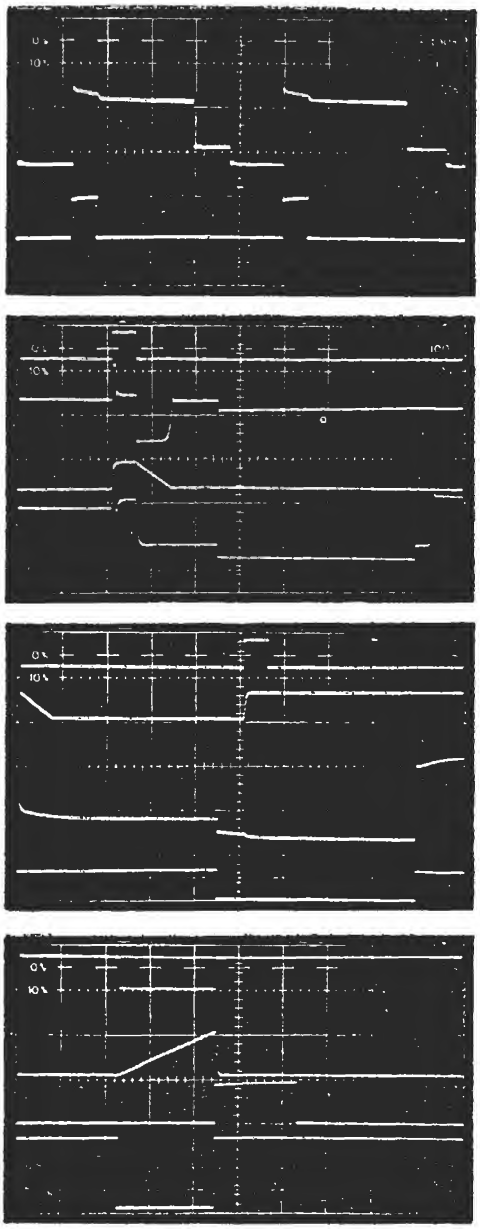
Waveforms for AE1

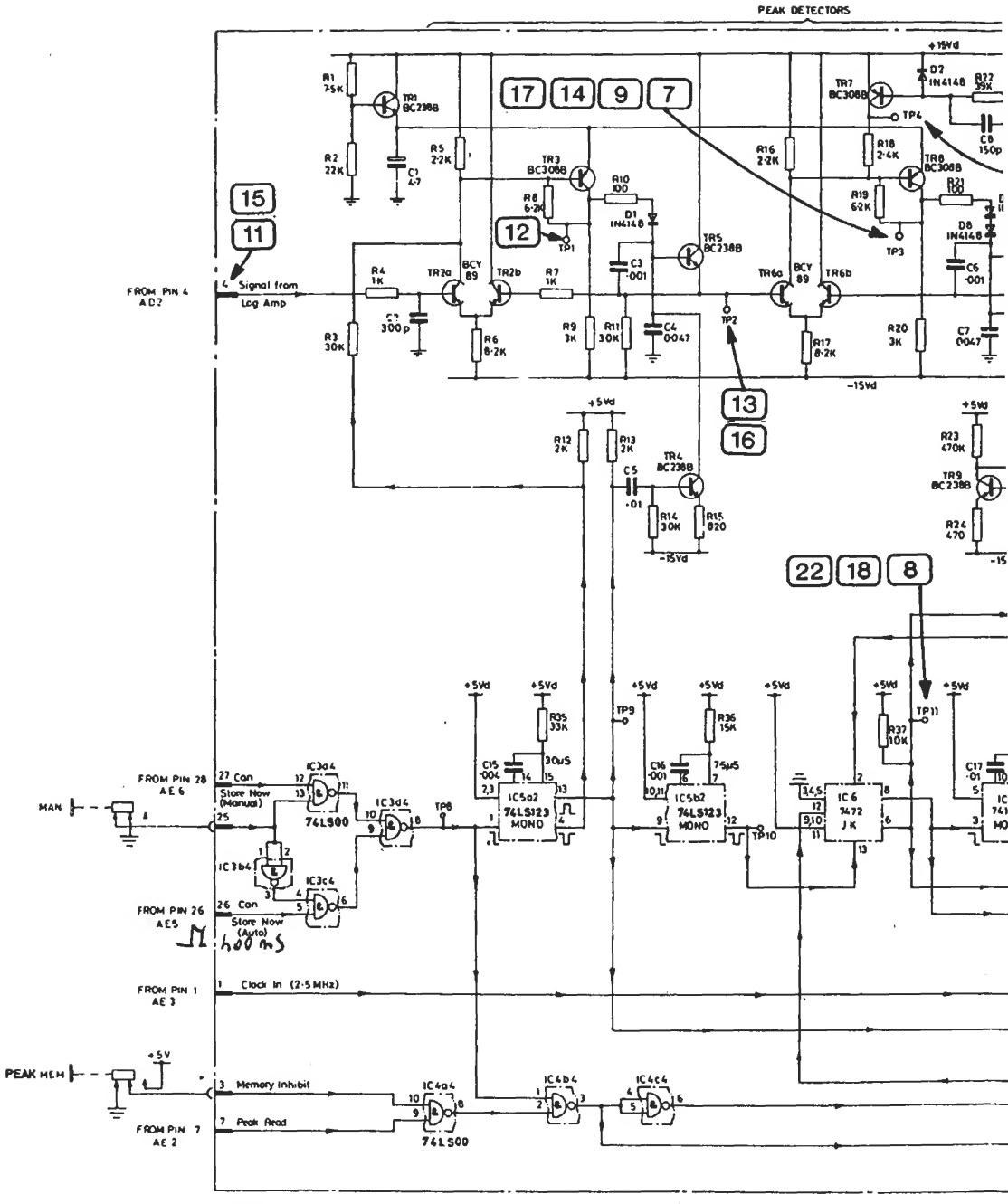
TF 2370 controls - SWEEP MODE : AUTO
HORIZONTAL SCALE and RANGE : (1) to (10) 0.5 MHz/DIV
(11) to (22) to 10 MHz/DIV
FILTER BANDWIDTH : (1) to (10) NORMAL
(11) to (22) WIDE
VERTICAL SCALE and RANGE : 0 dBm 10 dB/DIV
STORE and DISPLAY : (1), (2) and (5) to (22) HIGH DEFN
(3) and (4) A

For (1) to (10), connect the TRACKING GENERATOR OUTPUT to the INPUT.
For (11) to (22), use a pulse generator triggered from pin 26 on AE1. Connect the pulse generator to pin 4 on AE1, disconnecting the wire from pin 4 on AD2. Set the pulse width to 5 μs with a rise time of 1 μs. Trigger the oscilloscope (a.c. positive) from the sync output of the pulse generator. Adjust the output level of the pulse generator to give a display on the CATHODE RAY TUBE of 3 divisions high. Set the pulse generator to a delay of 20 μs for (11) to (14) and 60 μs for (15) to (22).

Horizontal scale	*Vertical scale*	*Datum level*	
			1
0.1 ms/div	5 V/div	0 V →	
0.1 ms/div	5 V/div	0 V →	2
			3
0.1 ms/div	5 V/div	0 V →	
0.1 ms/div	5 V/div	0 V →	4
			5
10 μs/div	2 V/div	0 V →	
10 μs/div	2 V/div	0 V →	6
50 μs/div	5 V/div	0 V →	7
50 μs/div	5 V/div	0 V →	8

50 µs/div	5 V/div	0 V →	9
50 µs/div	5 V/div	0 V →	10
10 µs/div	1 V/div	0 V →	11
10 µs/div	5 V/div	0 V →	12
10 µs/div	1 V/div	0 V →	13
10 µs/div	5 V/div	-5 V →	14
10 µs/div	1 V/div	0 V →	15
10 µs/div	1 V/div	0 V →	16
10 µs/div	5 V/div	0 V →	17
10 µs/div	5 V/div	0 V →	18
20 µs/div	5 V/div	0 V →	19
20 µs/div	2 V/div	0 V →	20
20 µs/div	5 V/div	0 V →	21
20 µs/div	2 V/div	0 V →	22





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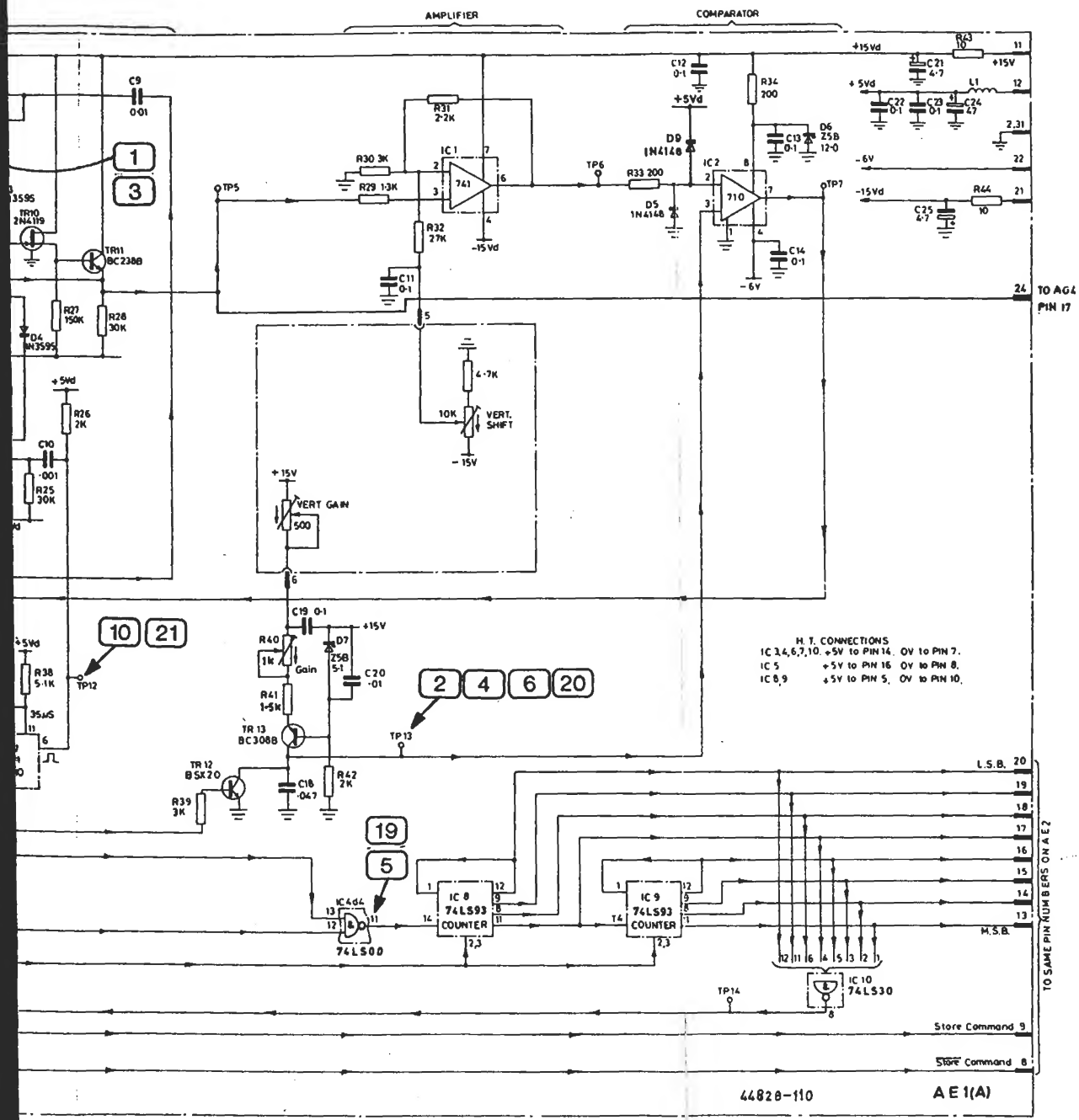


Fig. 7.19 Peak detector and analogue to digital converter AE1

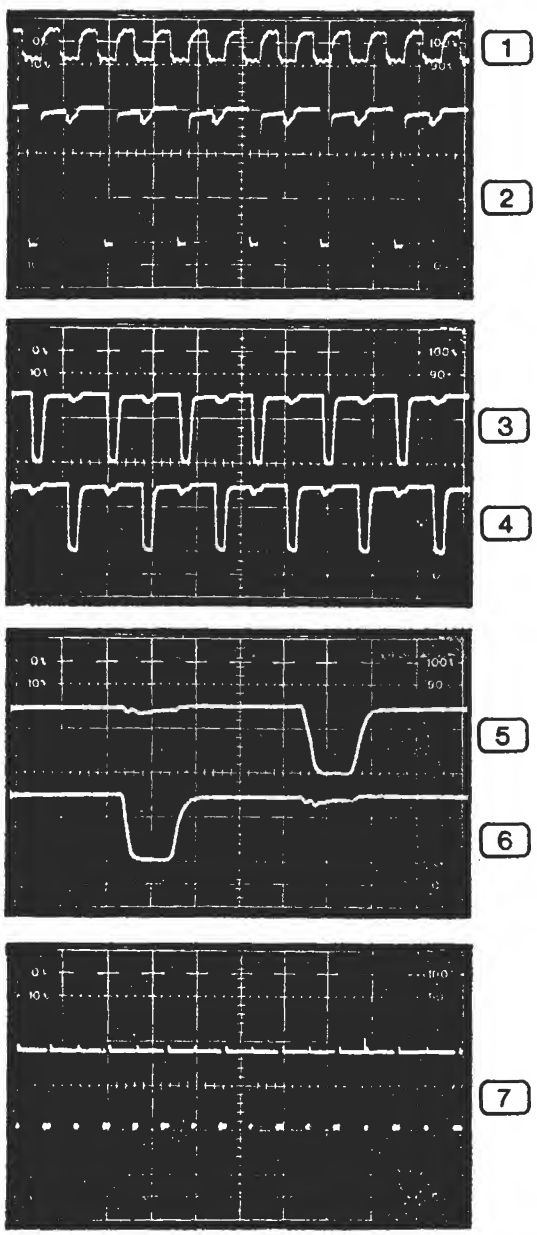
Waveforms for AE2

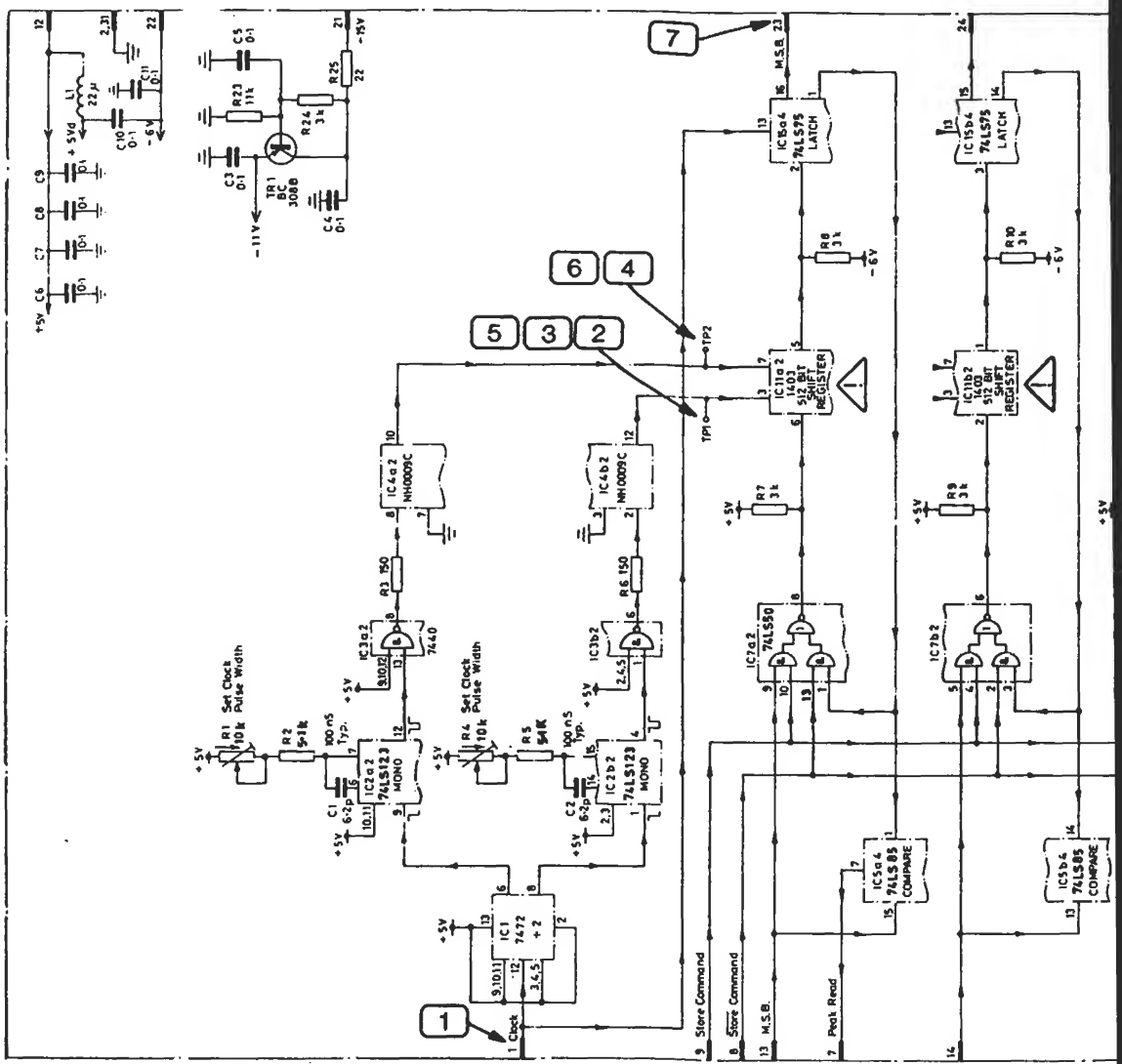
TF 2370 controls - SWEEP MODE : (1) to (6) AUTO
(7) SINGLE
HORIZONTAL SCALE and RANGE : 0.2 MHz/DIV
FILTER BANDWIDTH : NORMAL
VERTICAL SCALE and RANGE : 0 dBm 10 dB/DIV

For (7), connect the STANDARD 10 MHz OUTPUT to the INPUT. Adjust the REFERENCE FREQUENCY so that the 10 MHz display is at the centre of the CATHODE RAY TUBE.

Oscilloscope triggering - (7) from pin 18 on AE3 (d.c. negative).

Horizontal scale	*Vertical scale*	*Datum level*	
0.5 μs/div	5 V/div	0 V →	1
0.5 μs/div	5 V/div	0 V →	2
0.5 μs/div	10 V/div	0 V →	3
0.5 μs/div	10 V/div	0 V →	4
0.1 μs/div	10 V/div	0 V →	5
0.1 μs/div	10 V/div	0 V →	6
20 μs/div	2 V/div	0 V →	7

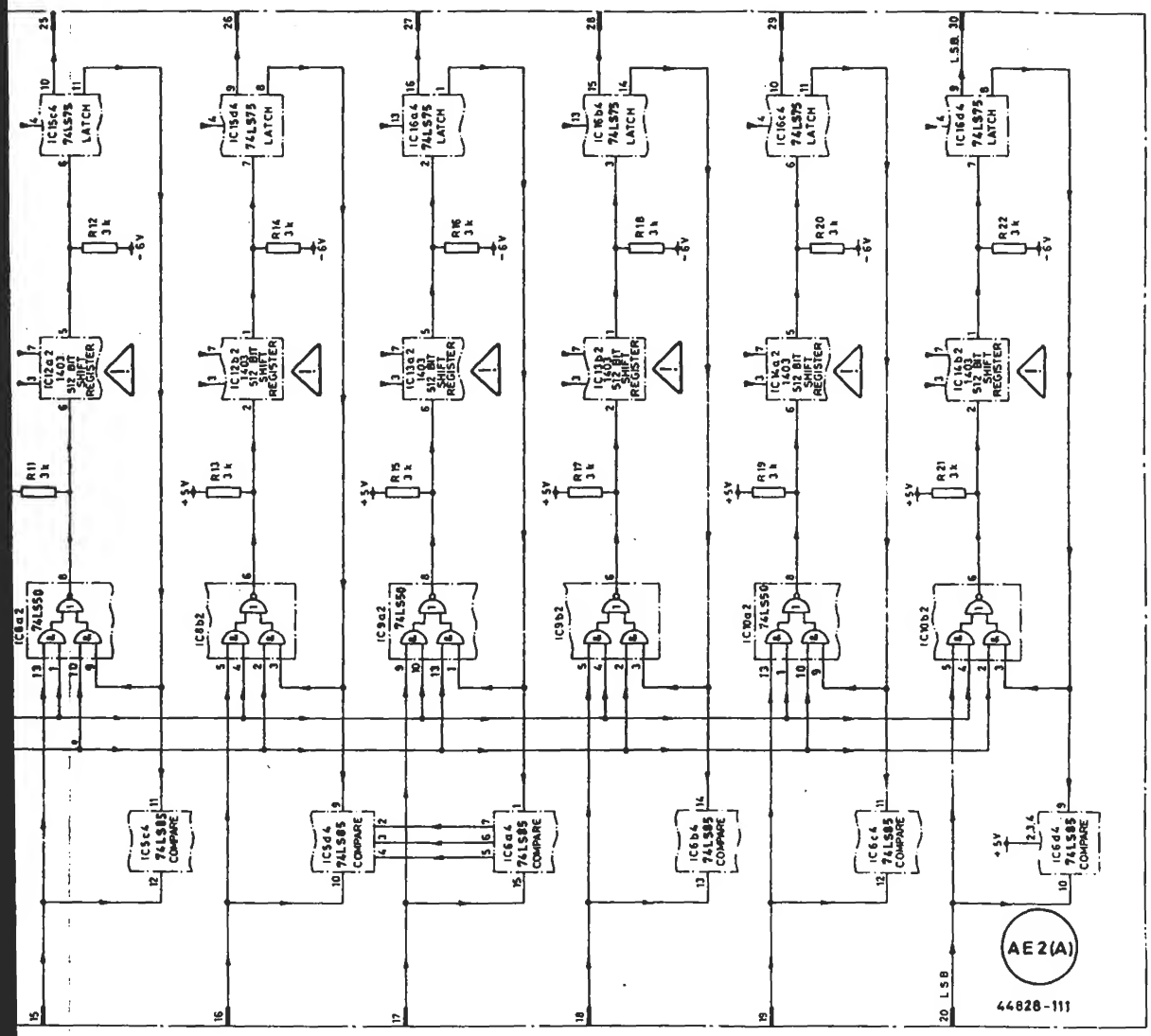




* Note...
CONNECTIONS FOR ALTENATIVE
PACKAGING OF IC11 TO 14 INCLUSIVE.

METAL CAN (SHOWN ABOVE)	PLASTIC DIL
PIN 1	PIN 5
" 2	" 6
" 3	" 7
" 4	" 8
" 5	" 1
" 6	" 2
" 7	" 3
" 8	" 4

Drg. No. Z44828-111L ISSUE 4



M. I. CONNECTIONS

7,8,9,& 10 +5V to PIN 14, E to PIN 7.
& 16 +5V to PIN 7 E to PIN 12.
5,& 6 +5V to PIN 16, 0V to PIN 8
2,13,& 14 +5Vd to PIN 4, -6V to PIN 8
+5Vd to PIN 11 -11V to PIN 5.

CAUTION - THE CASES OF ICs 11 12 13 & 14 ARE INTERNALLY CONNECTED SHORTING THE CASE MAY DESTROY THE DEVICE

THis symbol indicates Static Sensitive Component.

Fig. 7.20 Shift register store AE2

Waveforms for AE3

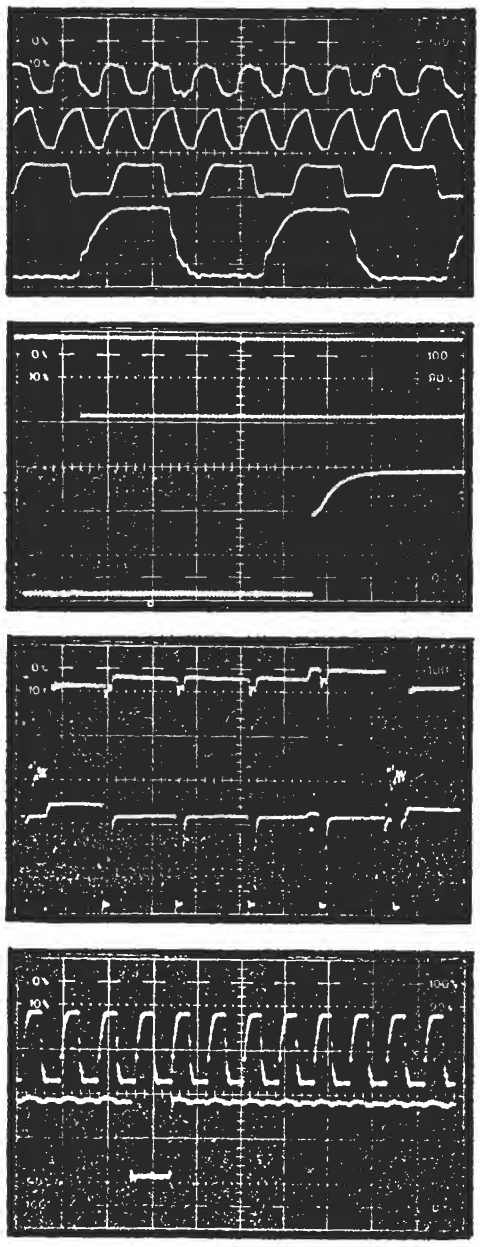
TF 2370 controls – SWEEP MODE : (1) to (8) AUTO
(9) to (15) SINGLE
HORIZONTAL SCALE and RANGE : 10 MHz/DIV
FILTER BANDWIDTH : WIDE
VERTICAL SCALE and RANGE : 0 dBm 10 dB/DIV
STORE and DISPLAY : HIGH DEFN
VERTICAL GRATICULE SHIFT : CAL

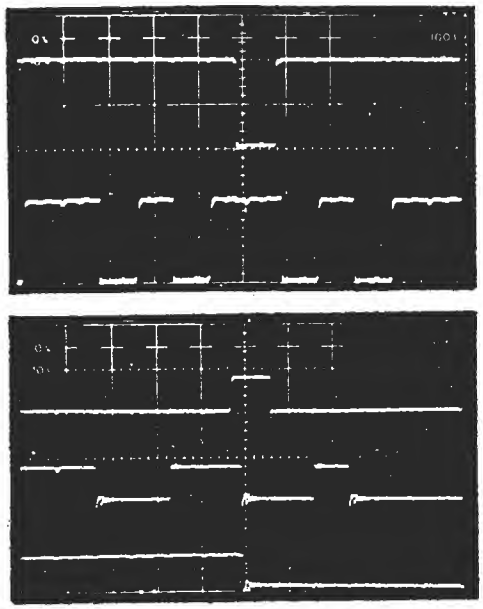
Oscilloscope triggering – (1) to (3) from pin 1 on AE2 (a.c. negative)
(5) and (6) from TP4 (a.c. positive)
(7) and (8) from TP6 (a.c. negative)
(13) to (15) from pin 13 (a.c. positive)

For (10) and (11), adjust the oscilloscope delay as necessary.

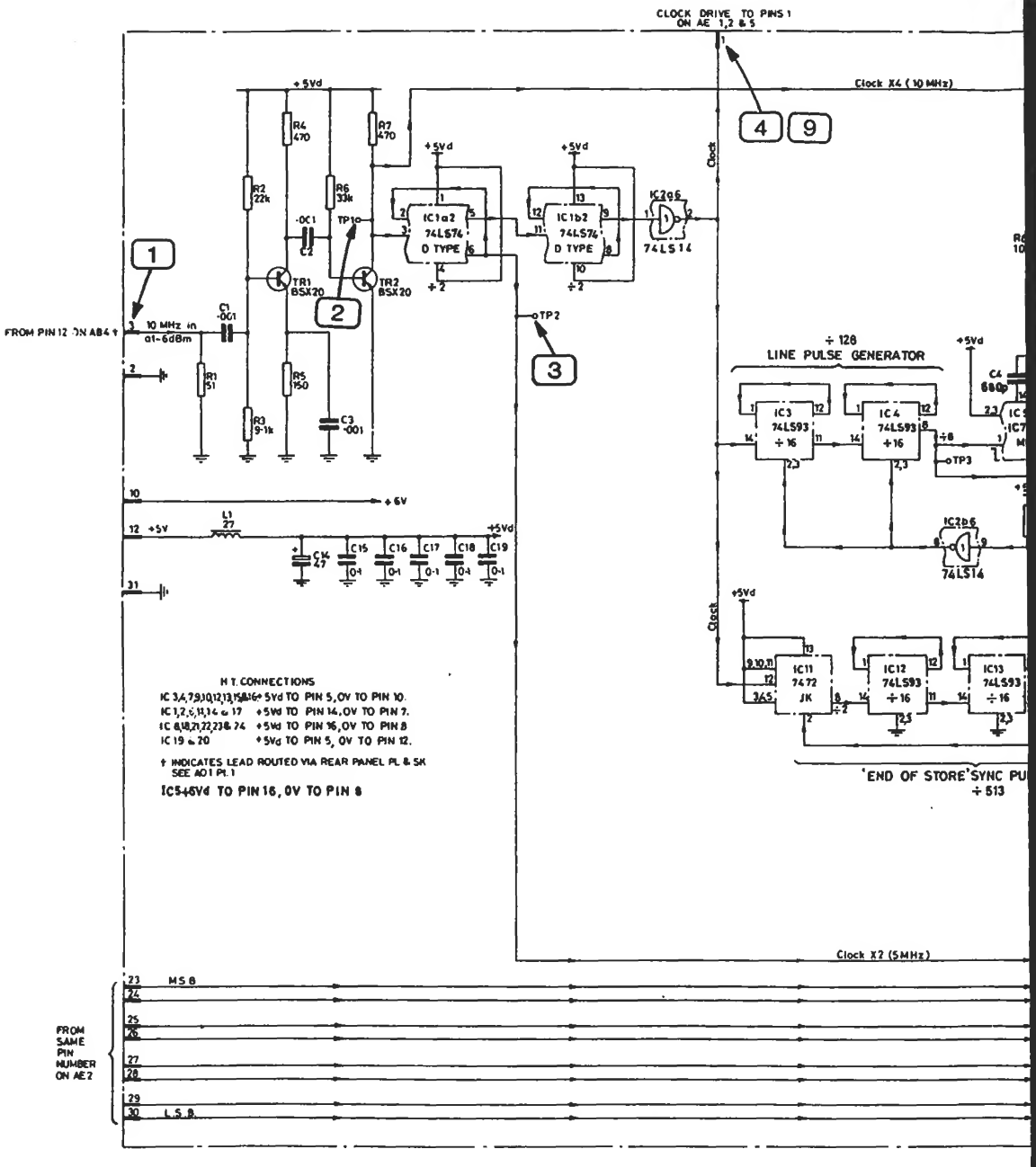
For (13) to (15), adjust the oscilloscope delay so that a pulse of (13) coincides with a falling edge of (14) to give a falling edge on (15) as shown.

Horizontal scale	*Vertical scale*	*Datum level*	
0.1 μs/div	0.5 V/div	0 V →	1
0.1 μs/div	5 V/div	0 V	2
0.1 μs/div	5 V/div	0 V →	3
			4
0.1 μs/div	2 V/div	0 V →	
5 μs/div	2 V/div	0 V	5
5 μs/div	2 V/div	0 V →	6
0.5 μs/div	2 V/div	0 V →	7
0.5 μs/div	2 V/div	0 V →	8
0.5 μs/div	2 V/div	0 V →	9
0.5 μs/div	2 V/div	0 V →	10





0.5 µs/div	2 V/div	0 V →	11
			12
0.5 µs/div	2 V/div	0 V →	
0.5 µs/div	5 V/div	0 V →	13
			14
0.5 µs/div	5 V/div	0 V →	
			15
0.5 µs/div	5 V/div	0 V →	



DRG. No Z44828-112J ISSUE 6

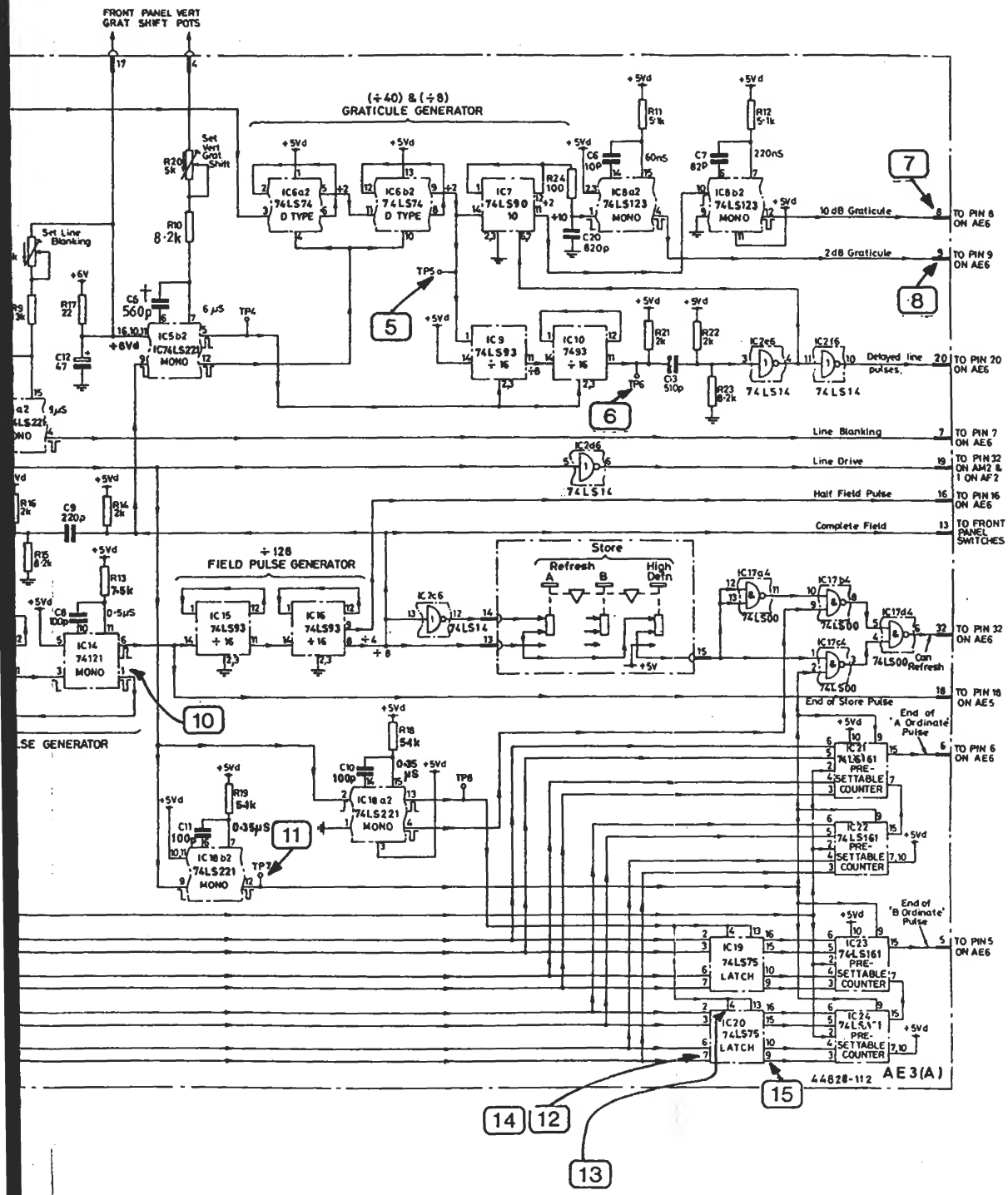


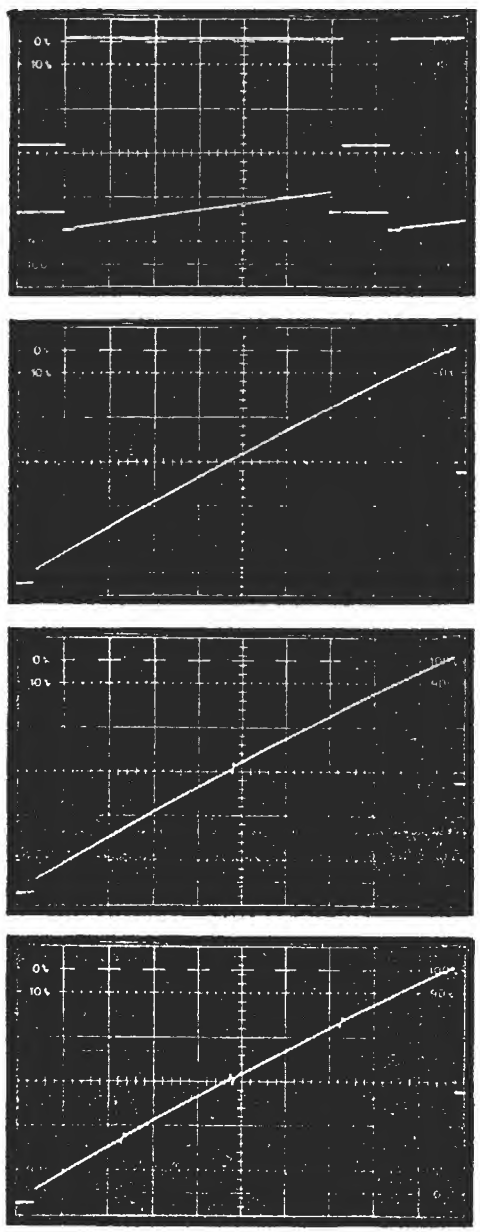
Fig. 7.21 Read-out waveforms generator AE3

Waveforms for AE4

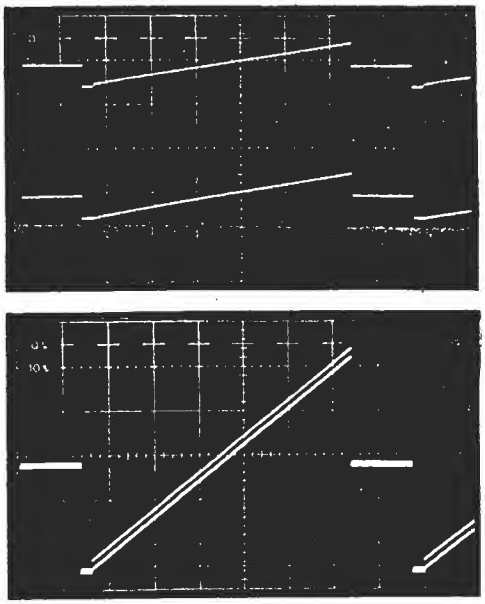
TF 2370 controls - SWEEP MODE : AUTO
HORIZONTAL SCALE and RANGE : 10 kHz/DIV
FILTER BANDWIDTH : WIDE
STORE and DISPLAY : HIGH DEFN

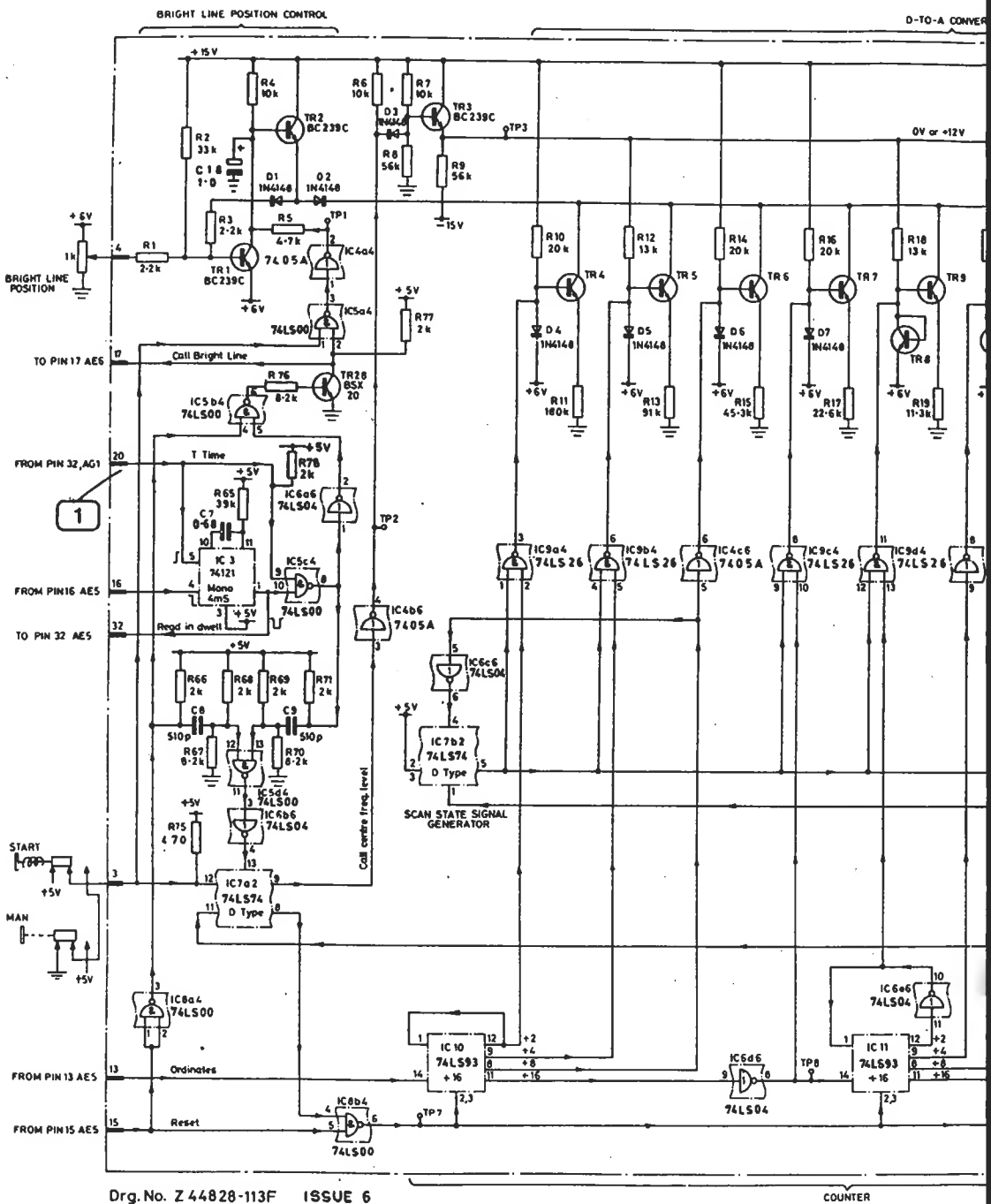
For (3) to (5), adjust the oscilloscope to give ramps between the corners of the tube. (3) is the required waveform. (4) is obtained when R31 is incorrectly set. (5) is obtained when R27 is incorrectly set.

Horizontal scale	*Vertical scale*	*Datum level*	
20 ms/div	2 V/div	0 V →	1
20 ms/div	5 V/div	0 V →	2
10 ms/div approx.	0.5 V/div approx.		3
10 ms/div approx.	0.5 V/div approx.		4
10 ms/div approx.	0.5 V/div approx.		5



20 ms/div	5 V/div	0 V →	6
20 ms/div	5 V/div	0 V →	7
20 ms/div	1 V/div	10 V } →	8
20 ms/div	1 V/div	10 V }	9





Drg. No. Z 44828-113F ISSUE 6

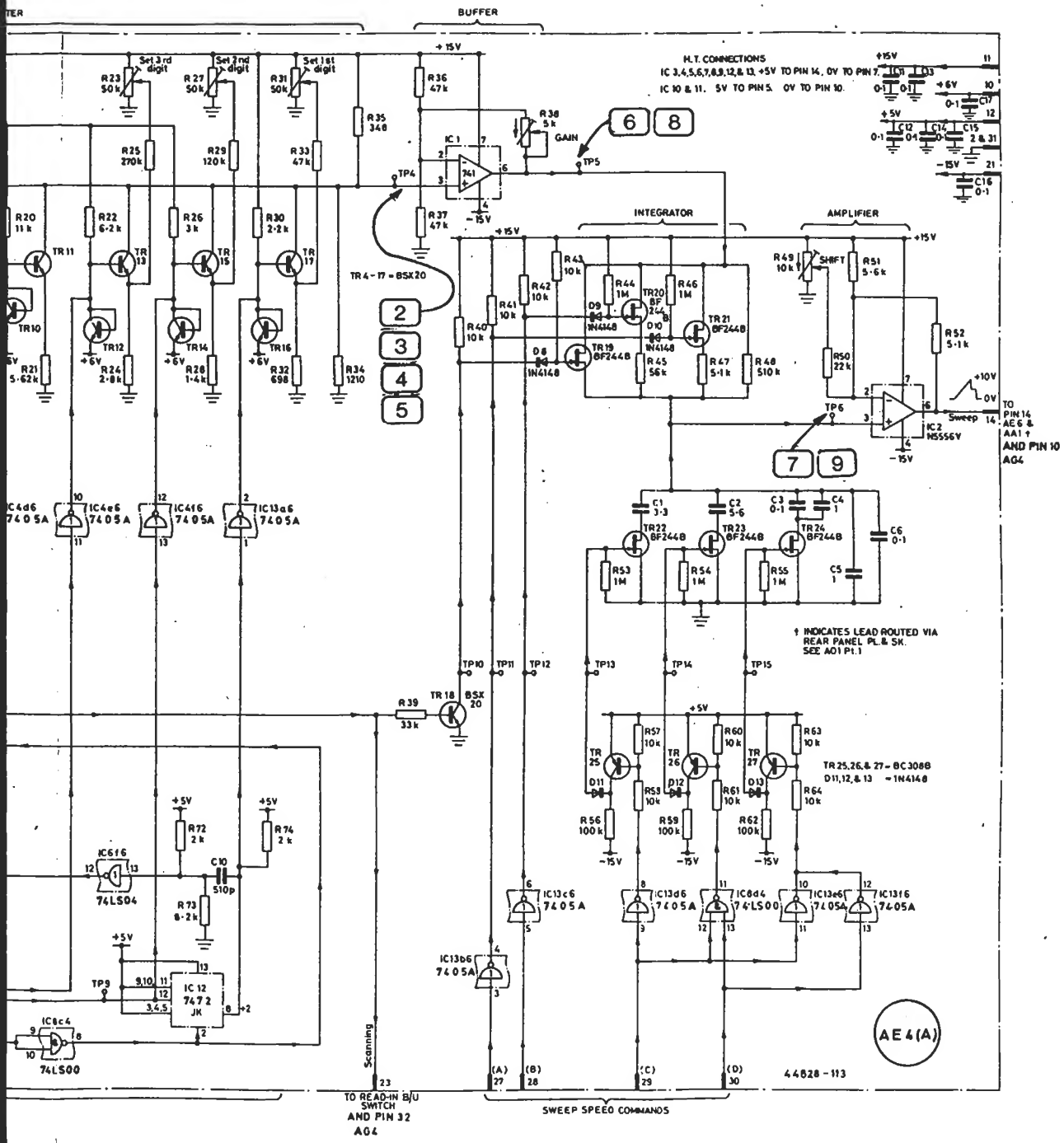


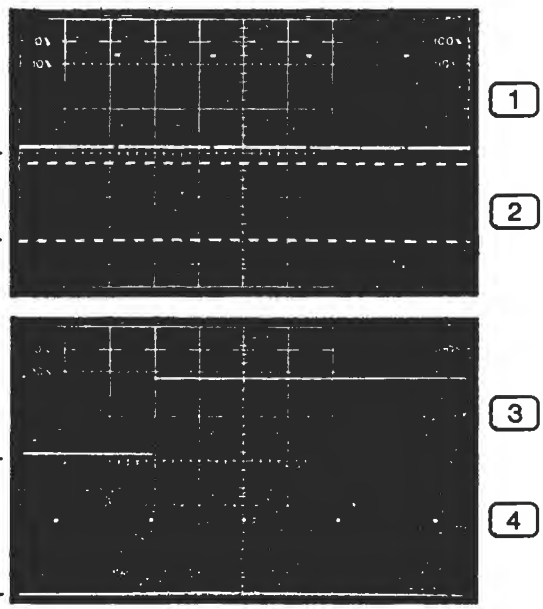
Fig. 7.22 Digital scan generator AE4

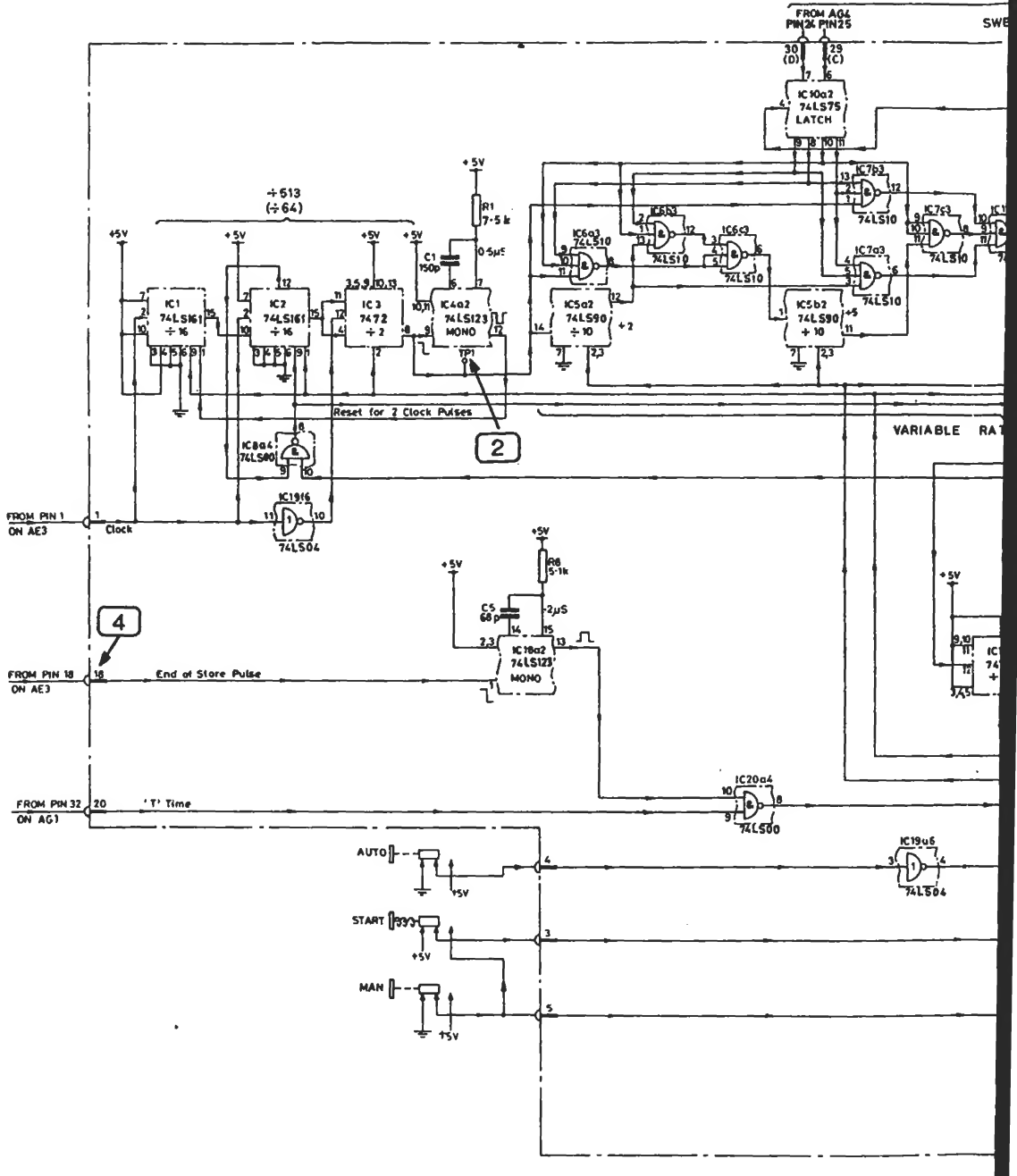
Waveforms for AE5

TF 2370 controls - SWEEP MODE : AUTO
HORIZONTAL SCALE and RANGE : 0.5 MHz/DIV
FILTER BANDWIDTH : (1) and (2) NARROW
(3) and (4) WIDE
STORE and DISPLAY : HIGH DEFN

Oscilloscope triggering - (4) from TP5 (a.c. negative).

Horizontal scale	*Vertical scale*	*Datum level*
0.5 ms/div	2 V/div	0 V →
0.5 ms/div	2 V/div	0 V →
0.1 ms/div	2 V/div	0 V →
0.1 ms/div	2 V/div	0 V →





DRG. No. Z44828 - 114G ISSUE 4

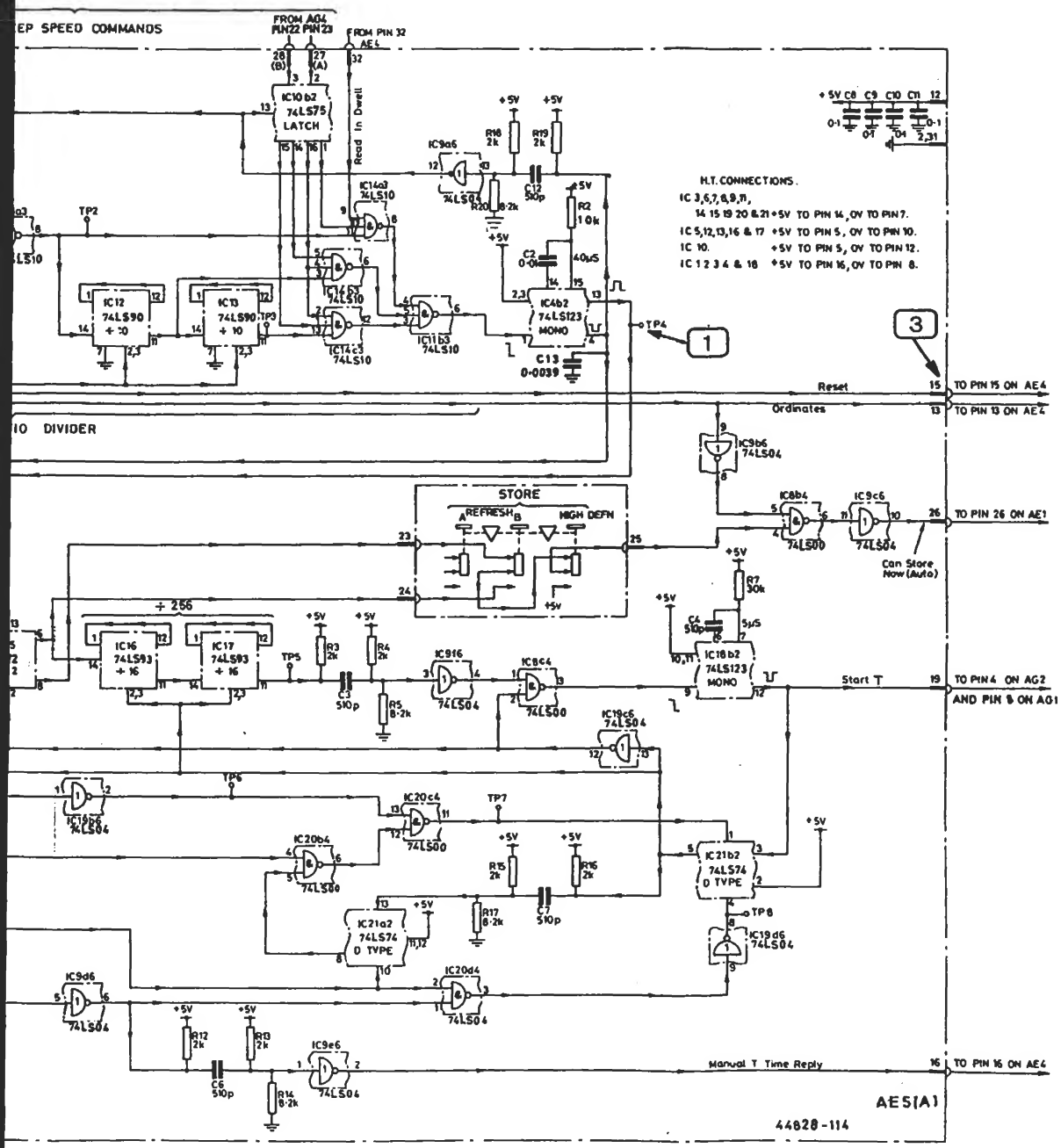


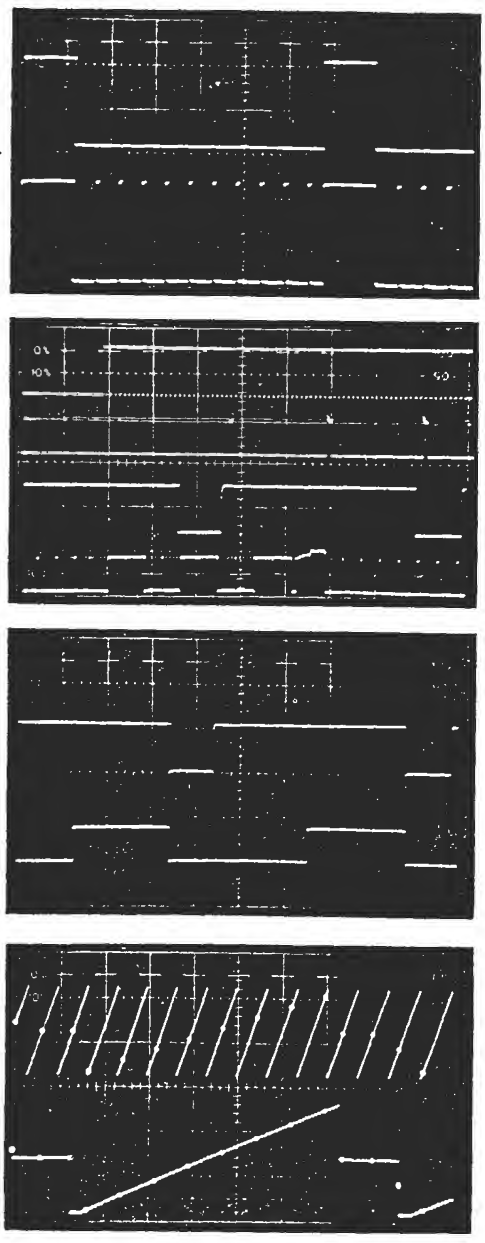
Fig. 7.23 Read-in sequence controller AE5

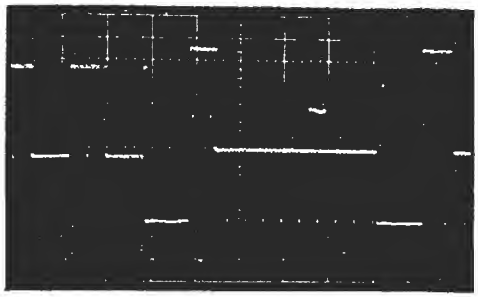
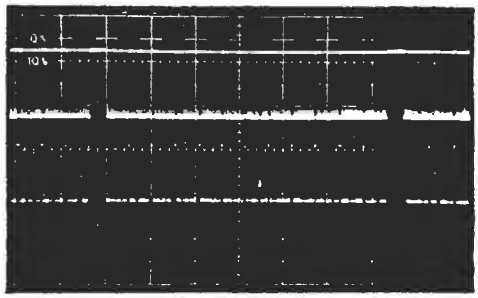
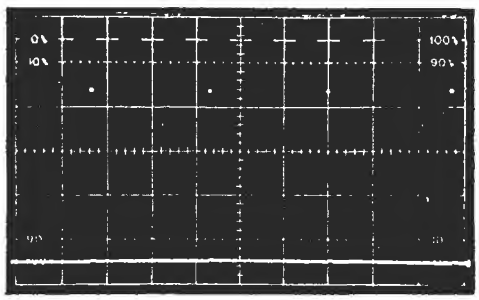
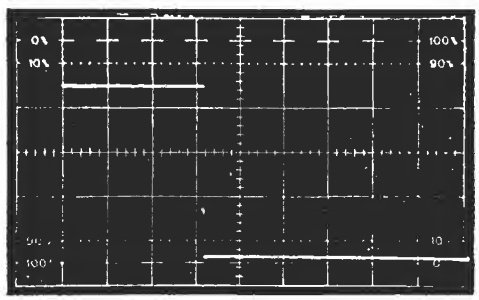
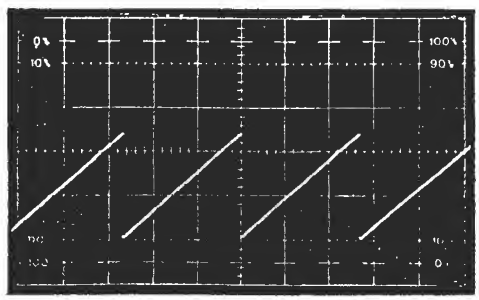
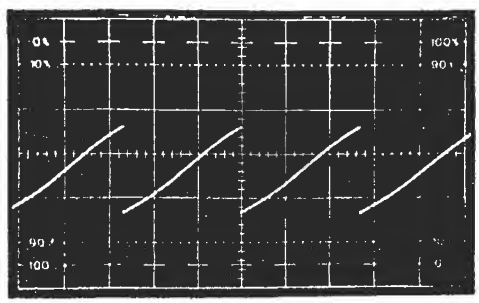
Waveforms for AE6

TF 2370 controls - SWEEP MODE : (1) to (6), (9) and (10) AUTO
(7) and (8) SINGLE
HORIZONTAL SCALE and RANGE : (9) and (10) 10 kHz/DIV
FILTER BANDWIDTH : (9) and (10) WIDE
STORE and DISPLAY : HIGH DEFN
VERTICAL GRATICULE SHIFT : CAL
HORIZONTAL GRATICULE SHIFT : CAL
HORIZONTAL GRATICULE GAIN : CAL

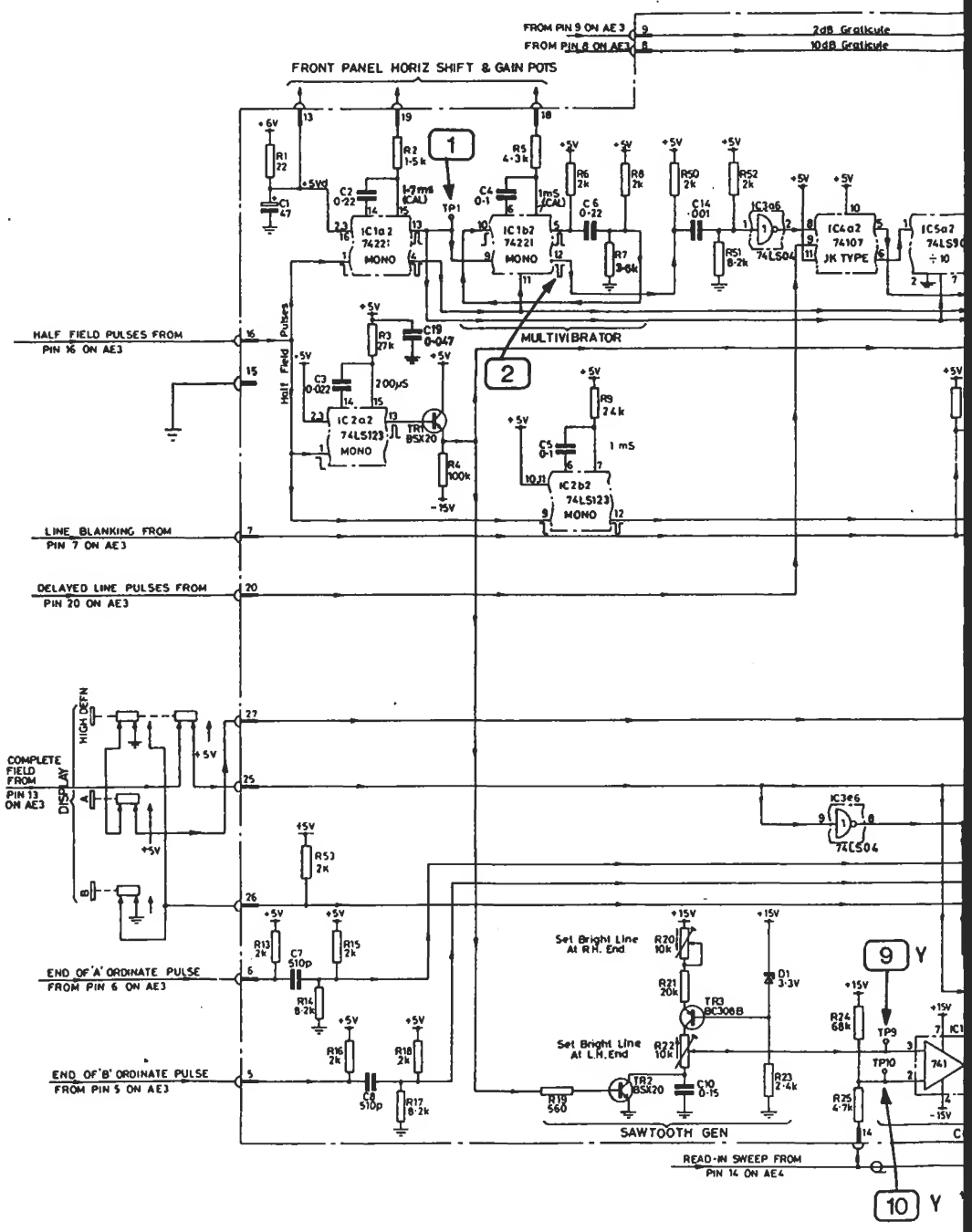
For (7) and (8), connect the TRACKING GENERATOR OUTPUT to the INPUT.
Oscilloscope triggering - (3) to (6) from TP8 (a.c. negative).
For (3) to (6), adjust the oscilloscope delay as necessary.
For (9) and (10), set the oscilloscope to 'chop'. Connect TP11 through an a.c. coupling to the intensity modulation input of the oscilloscope.

Horizontal scale	*Vertical scale*	*Datum level*	
2 ms/div	2 V/div	0 V →	1
2 ms/div	2 V/div	0 V →	2
0.5 ms/div	5 V/div		3
0.5 ms/div	5 V/div		4
10 µs/div	5 V/div		5
10 µs/div	5 V/div		6
10 µs/div	5 V/div	0 V →	7
10 µs/div	5 V/div	0 V →	8
20 ms/div	5 V/div	0 V →	9
20 ms/div	5 V/div	0 V →	10



5	10 μs/div	1 V/div	3 V →	 11
6	2 ms/div	10 V/div	70 V →	 12
7	5 ms/div	1 V/div	0 V →	 13
8	50 μs/div	1 V/div	0 V →	 14
9	5 ms/div	5 V/div	0 V	 15
10	5 ms/div	5 V/div	0 V →	 16

. coupling



DRG. No. Z44828 -115V ISSUE 5

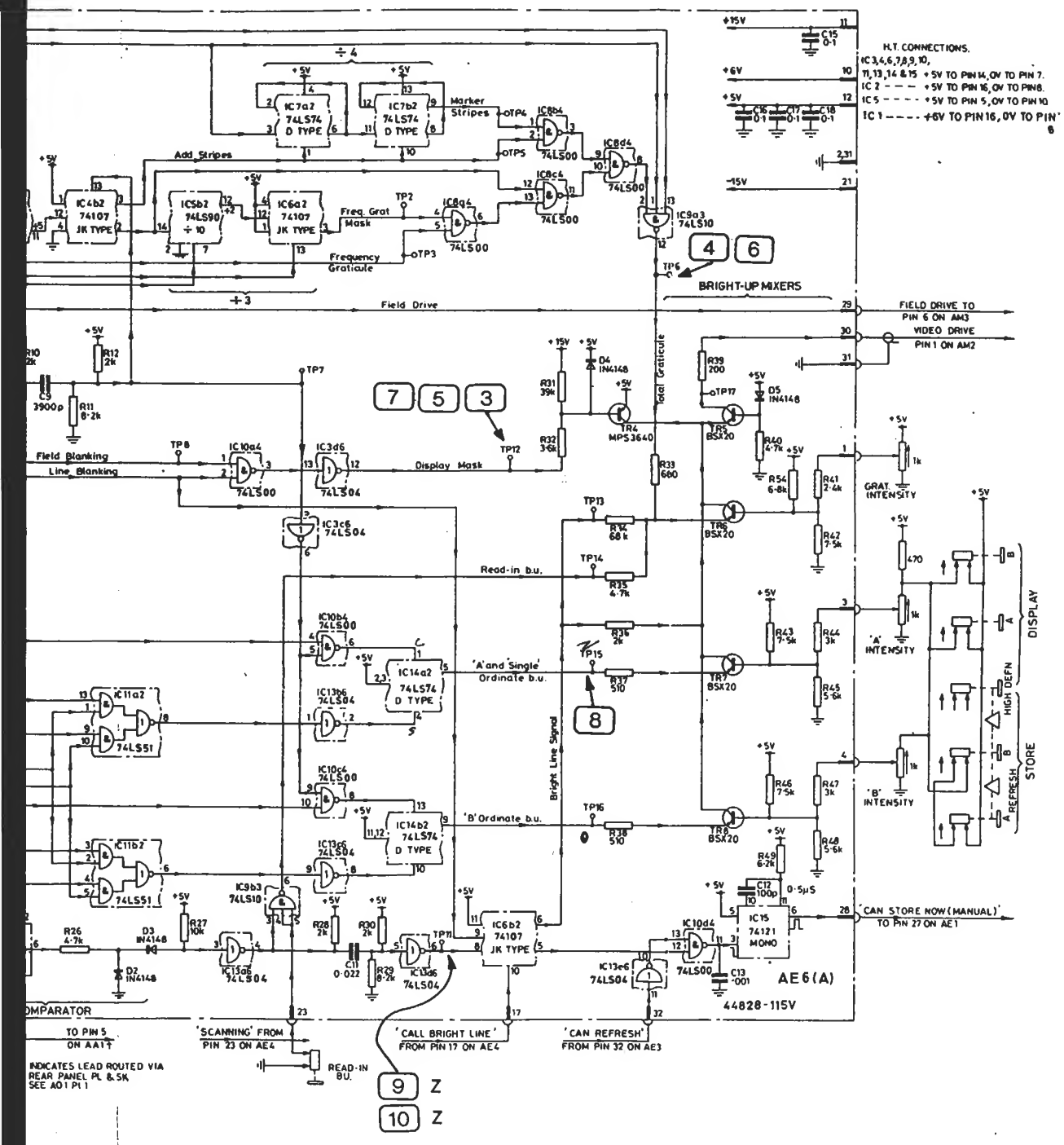
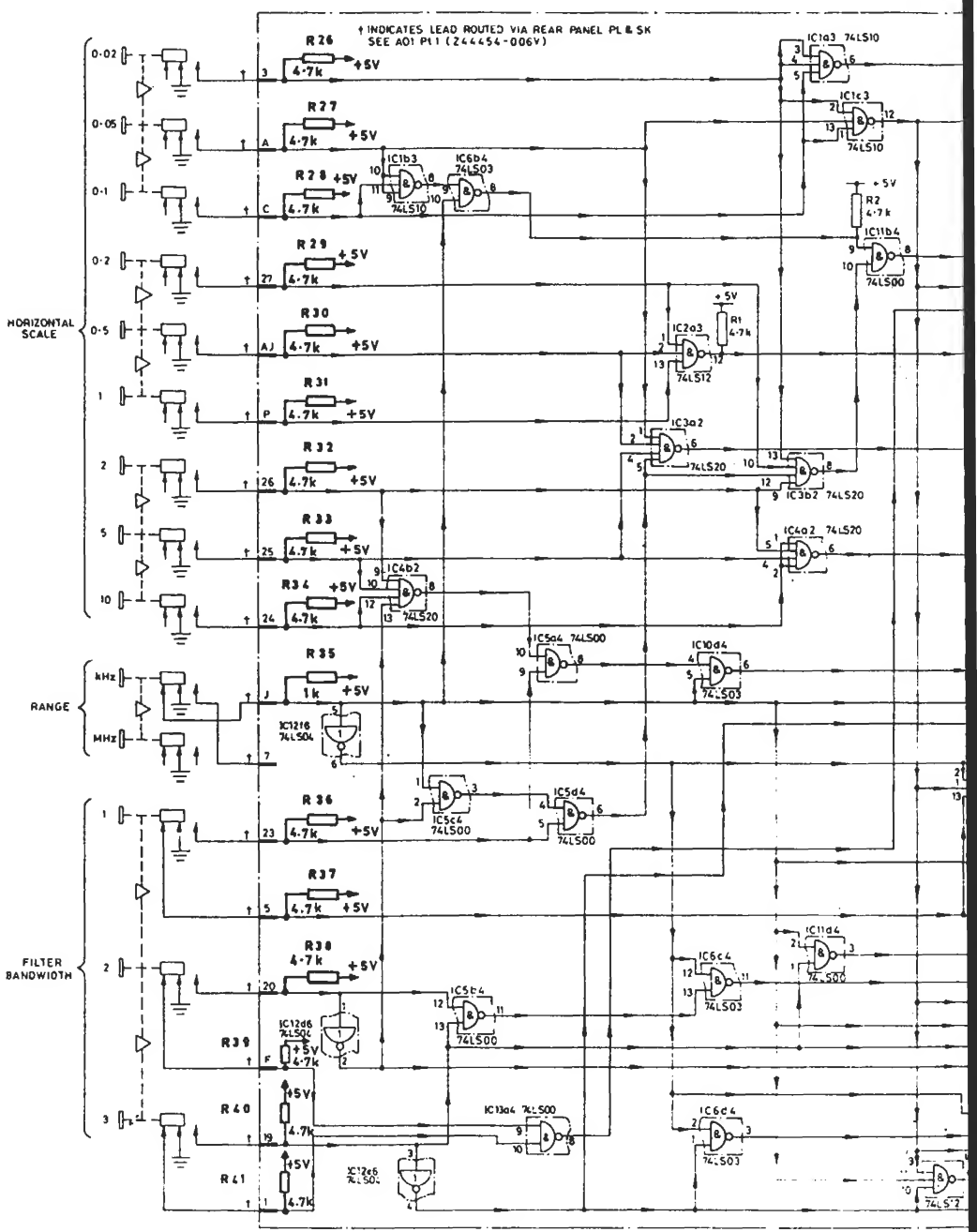


Fig. 7.24 Frequency graticule generator, and bright-up processing AE6



DRG No. Z44828 – 362 ISSUE 1

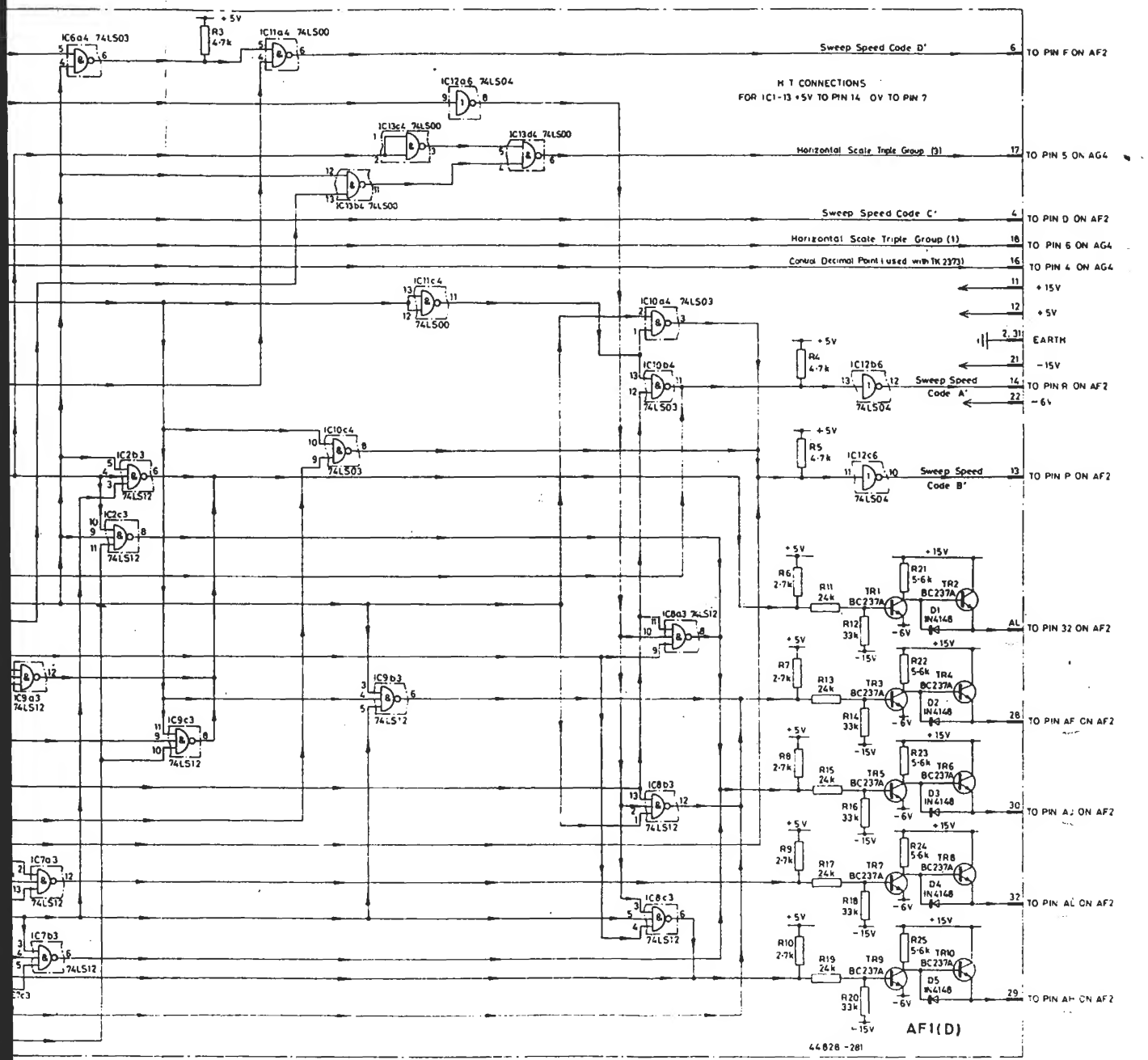
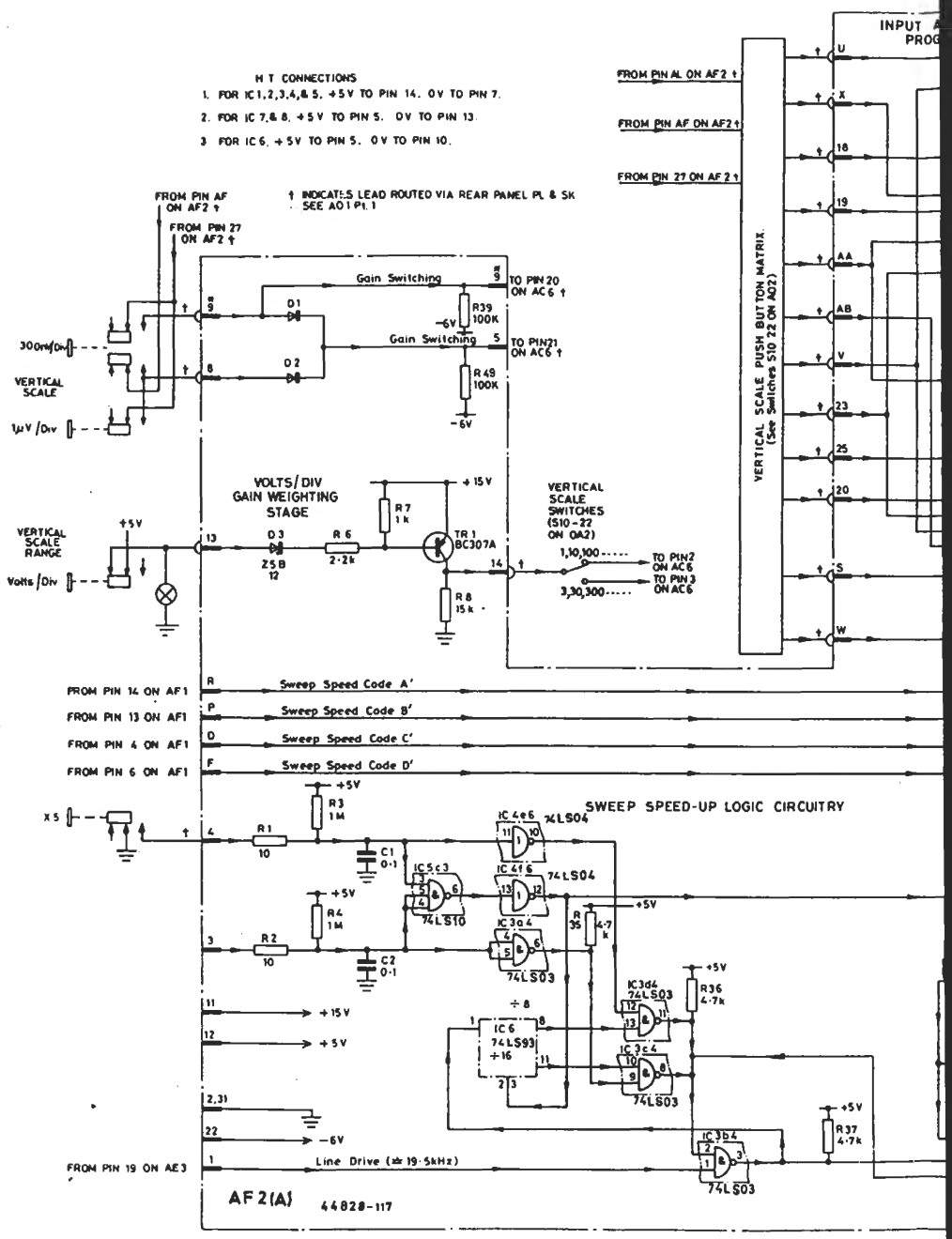


Fig. 7.25 System control logic (1) AF1



DRG. No. Z44828-117W ISSUE 2

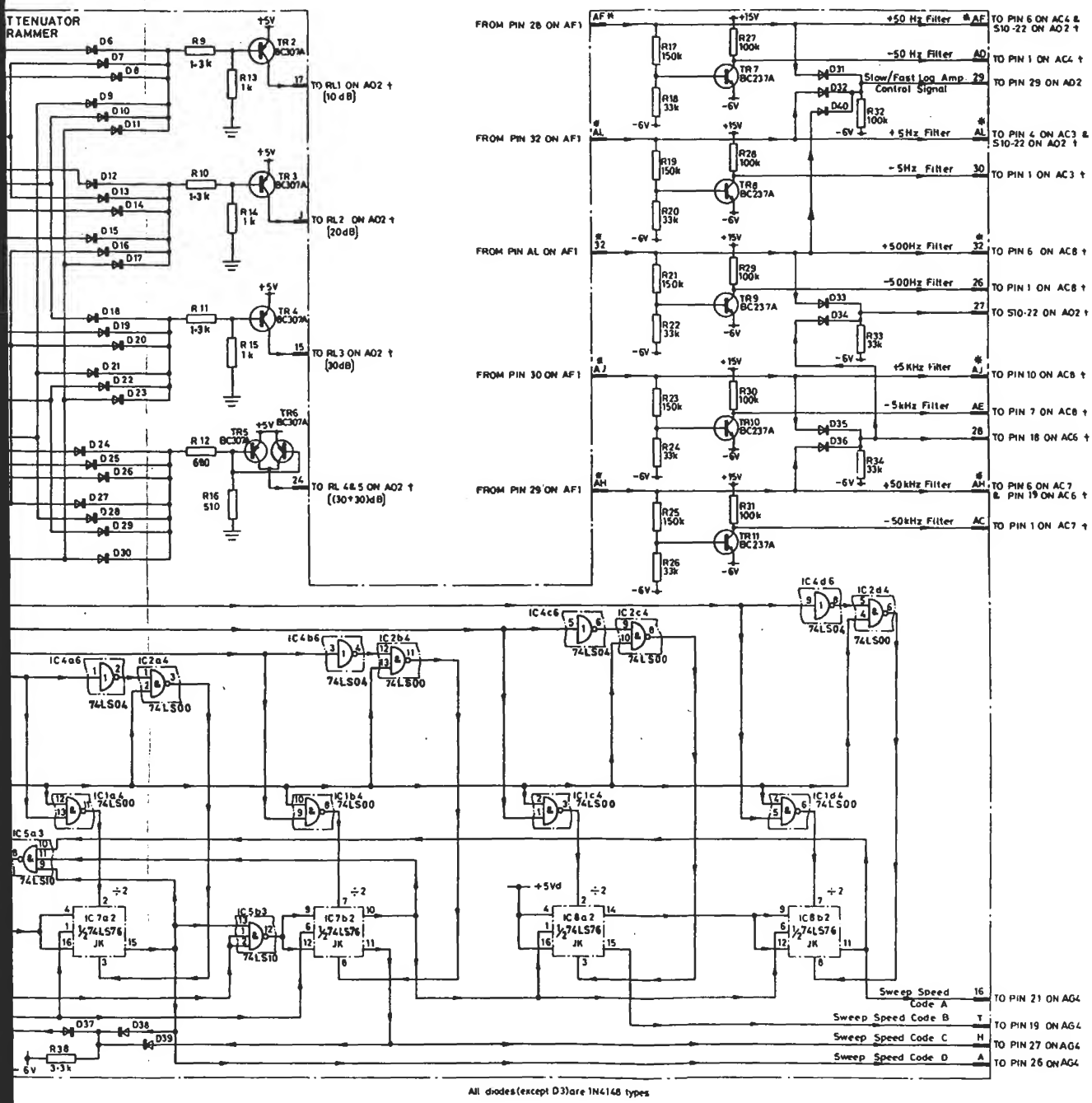


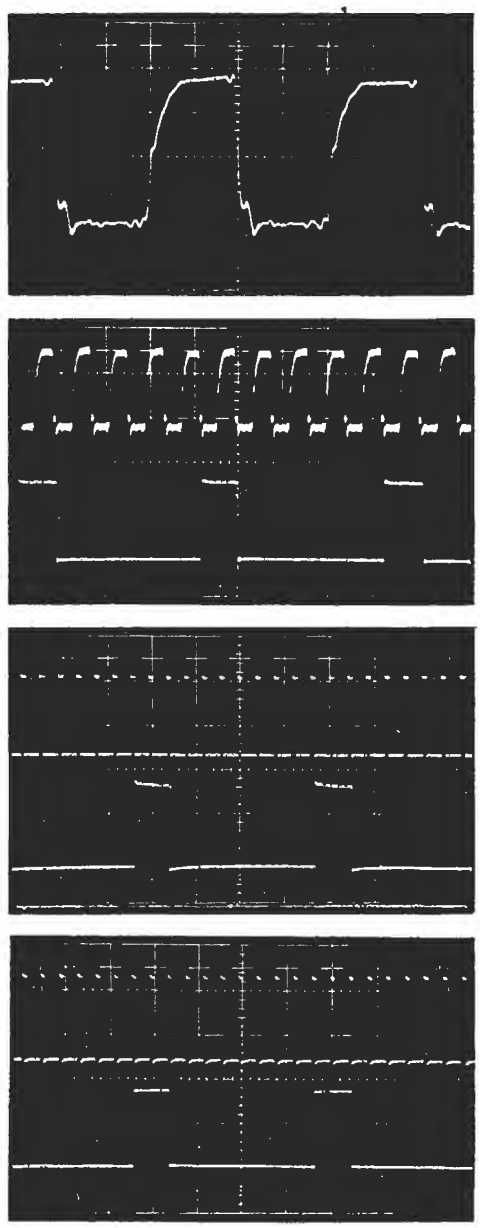
Fig. 7.26 System control logic (2) AF2

Waveforms for AG4

TF 2370 controls - HORIZONTAL SCALE : (26),(27),(32),(33),(38) and (39) .02, .05 or .1
(30),(31),(36) and (37) .2, .5 or 1
(24),(25),(28),(29),(34) and (35) 2, 5 or 10
HORIZONTAL RANGE : (12) to (14),(17) to (19) and (28) to (33) kHz/DIV
(15),(16),(20) to (27) and (34) to (39) MHz/DIV

Remove board AE5.
For (1) to (27), also connect a shorting link across R9 on AG4.

Horizontal scale	*Vertical scale*	
0.1 µs/div	1 V/div	1
0.5 µs/div	2 V/div	2
0.5 µs/div	2 V/div	3
5 µs/div	2 V/div	4
5 µs/div	2 V/div	5
50 µs/div	2 V/div	6
50 µs/div	2 V/div	7

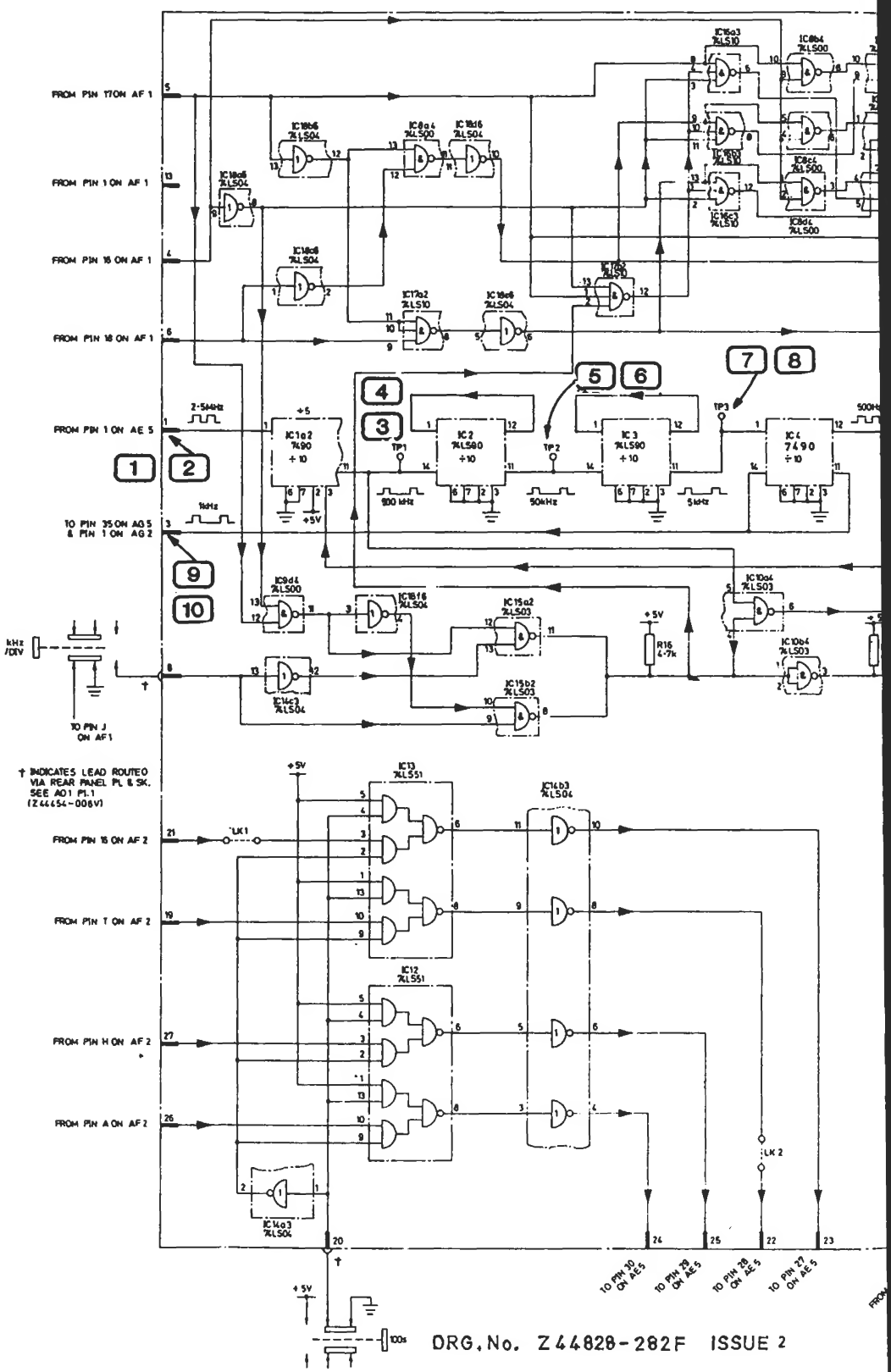


36

37

38

39



DRG. No. Z44828-282F ISSUE 2

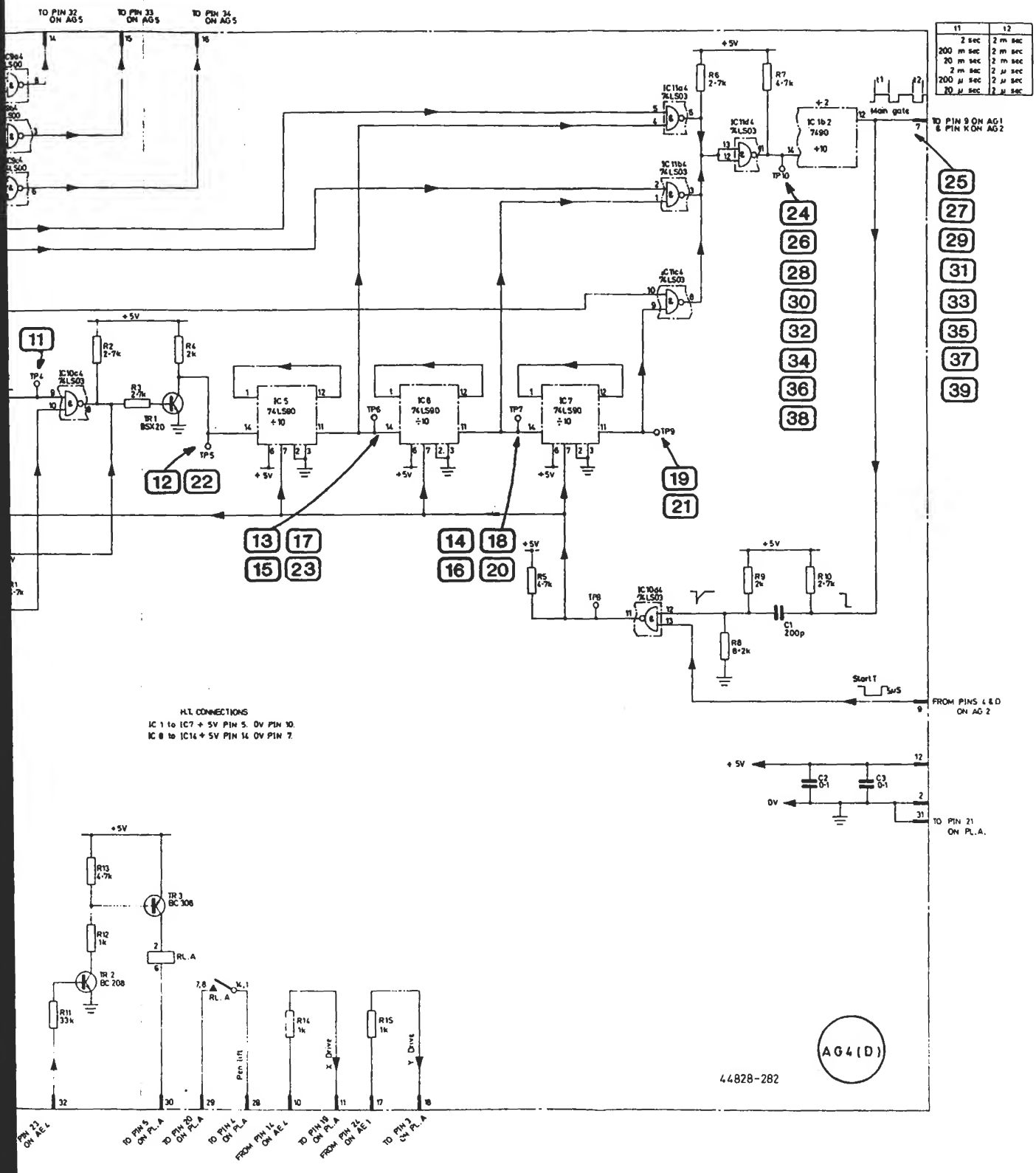
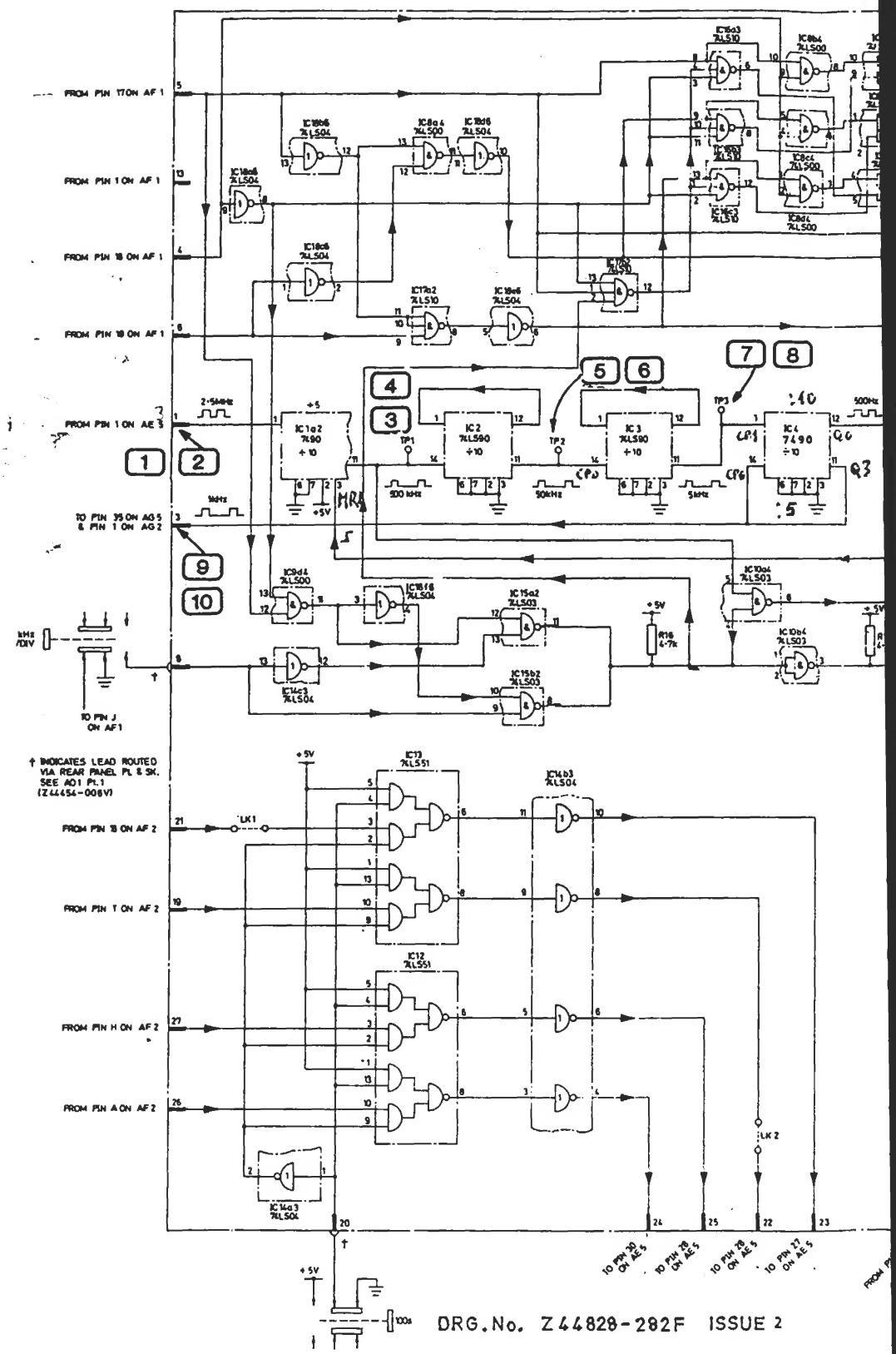
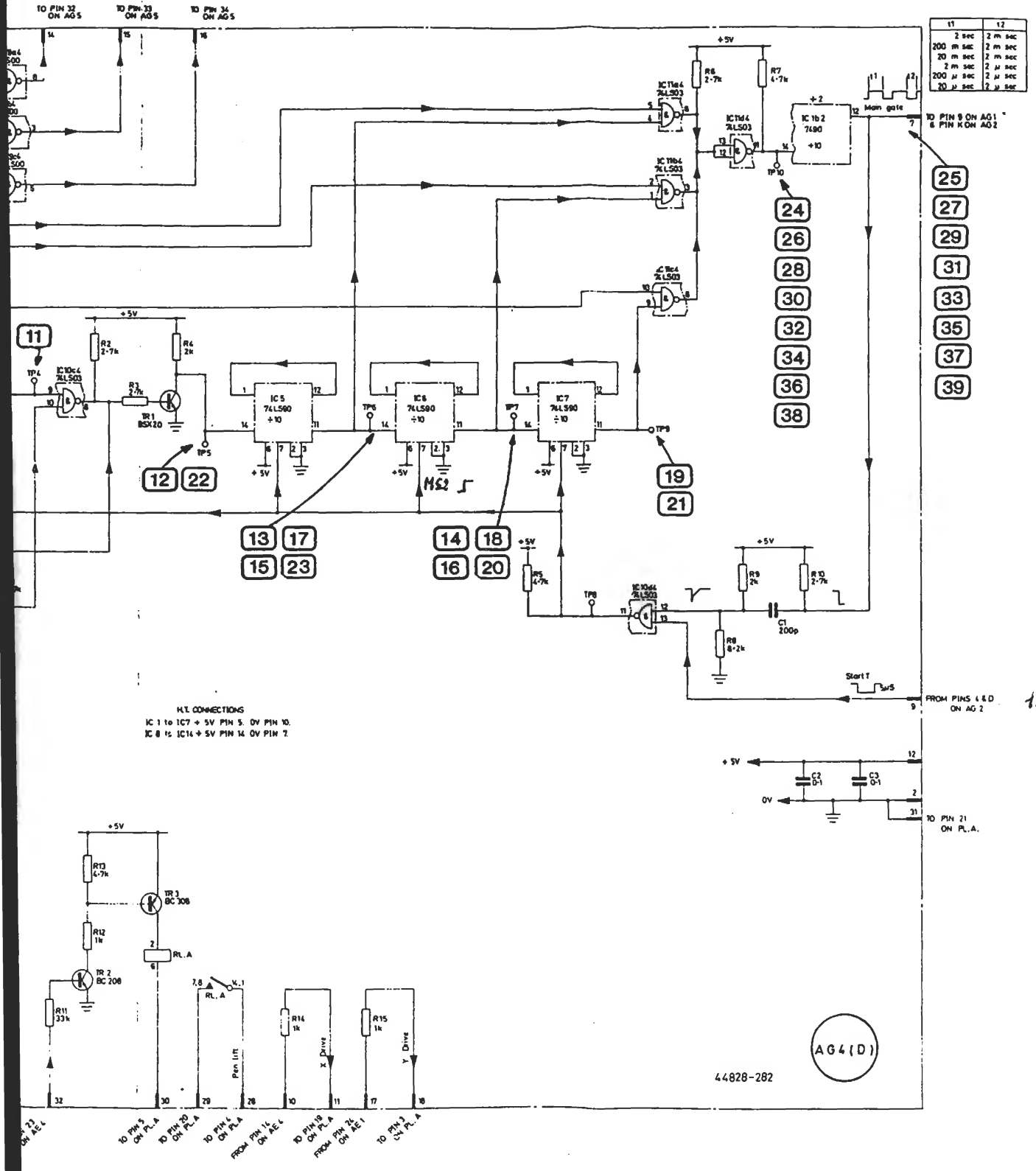


Fig. 7.27 Counter time base and X-Y recorder output AG4



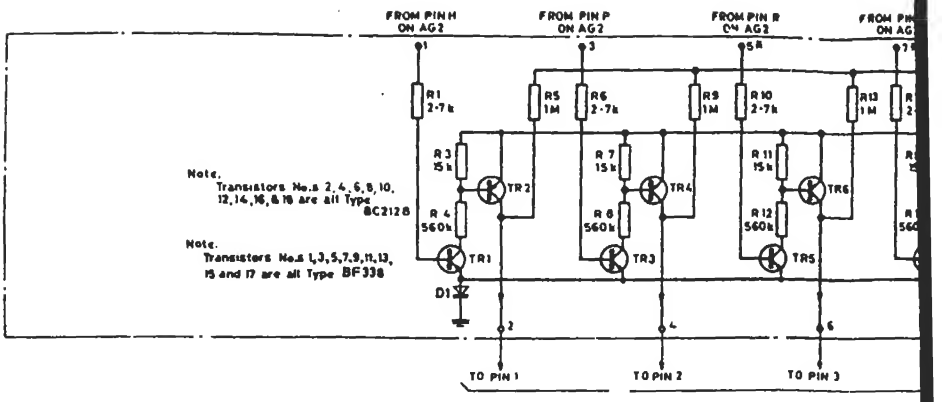
DRG. No. Z44828-282F ISSUE 2

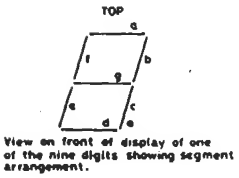


CP1 Q1 Q4 CPO
MR1 Q2 Q3
MR2 Q3 Q0
Q4 Q3
Q5 Q0
MS1 Q6 Q1
MS2 Q7 Q2

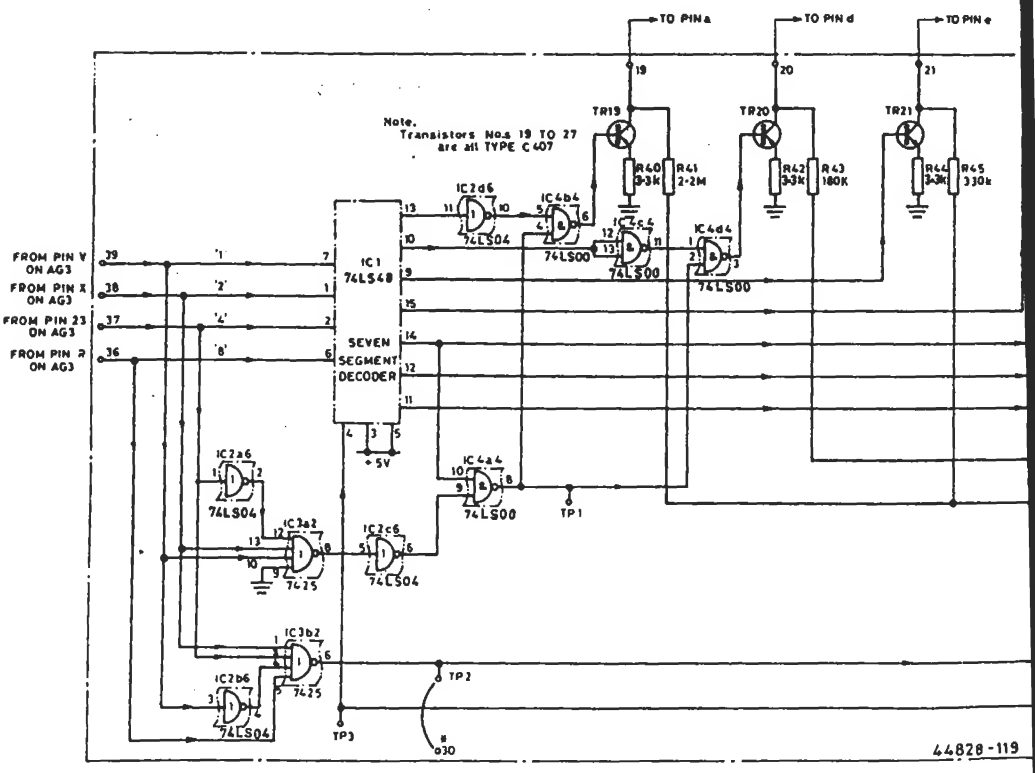
74LS90

Fig. 7.27 Counter time base and X-Y recorder output AG4





View on front of display of one of the nine digits showing segment arrangement.



DRG. No. Z44828-119T ISSUE 4

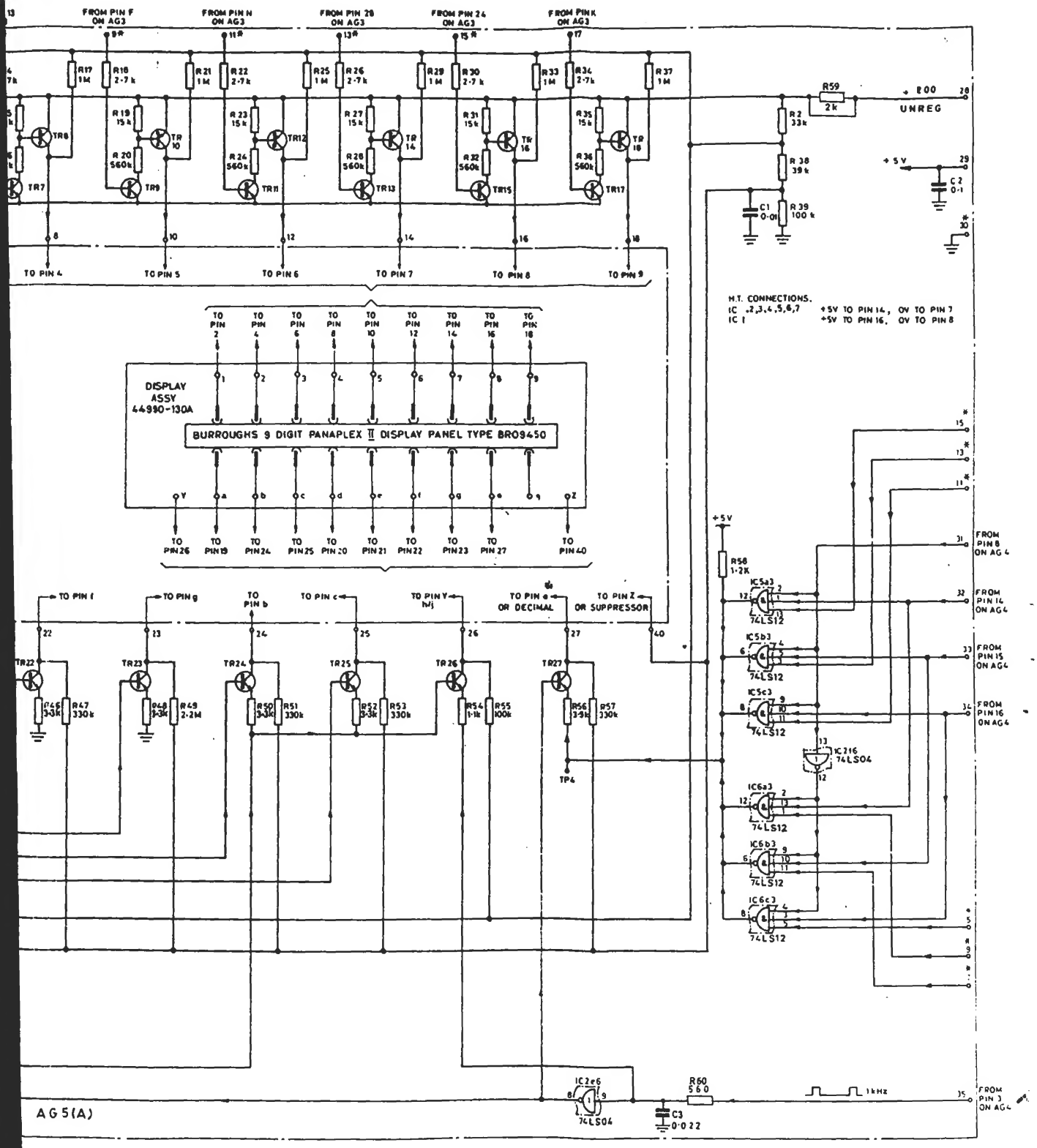
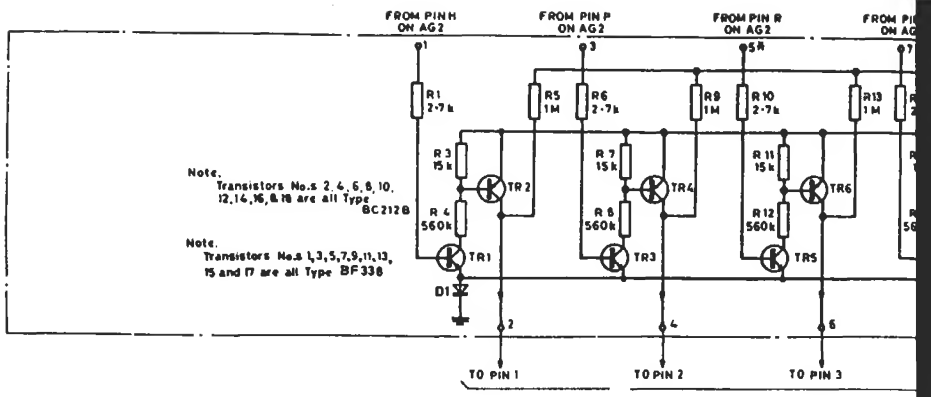
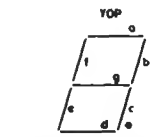
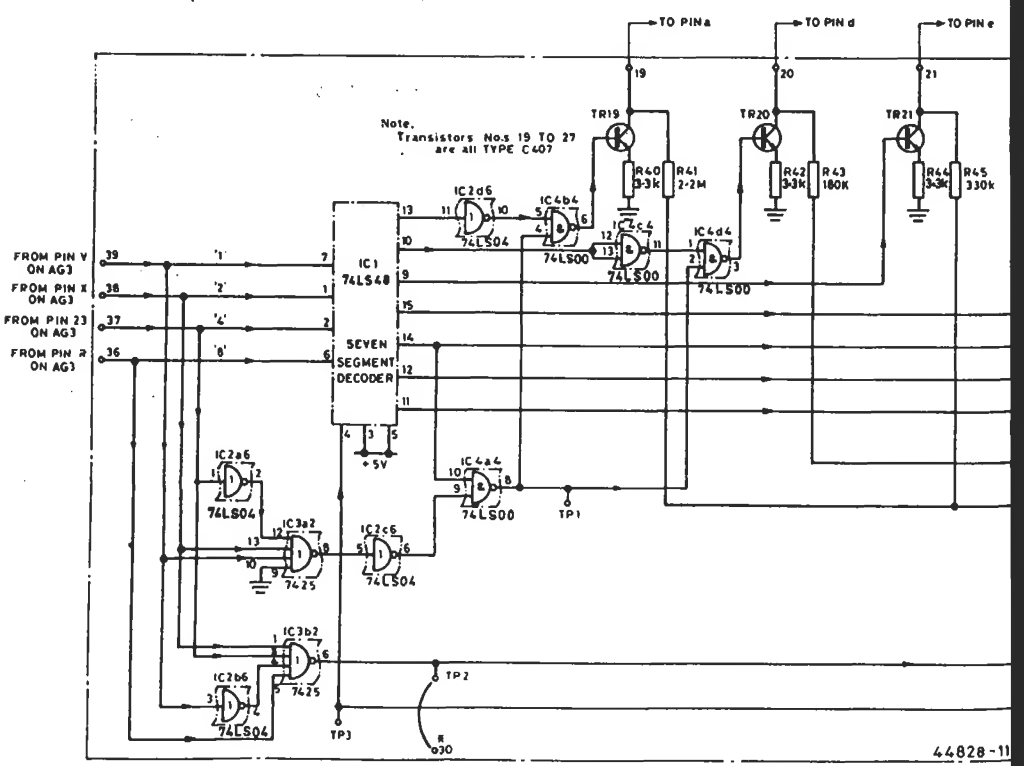


Fig. 7.28 Counter display AG5





View on front of display of one of the nine digits showing segment arrangement.



DRG. No. Z44828-119T ISSUE 4

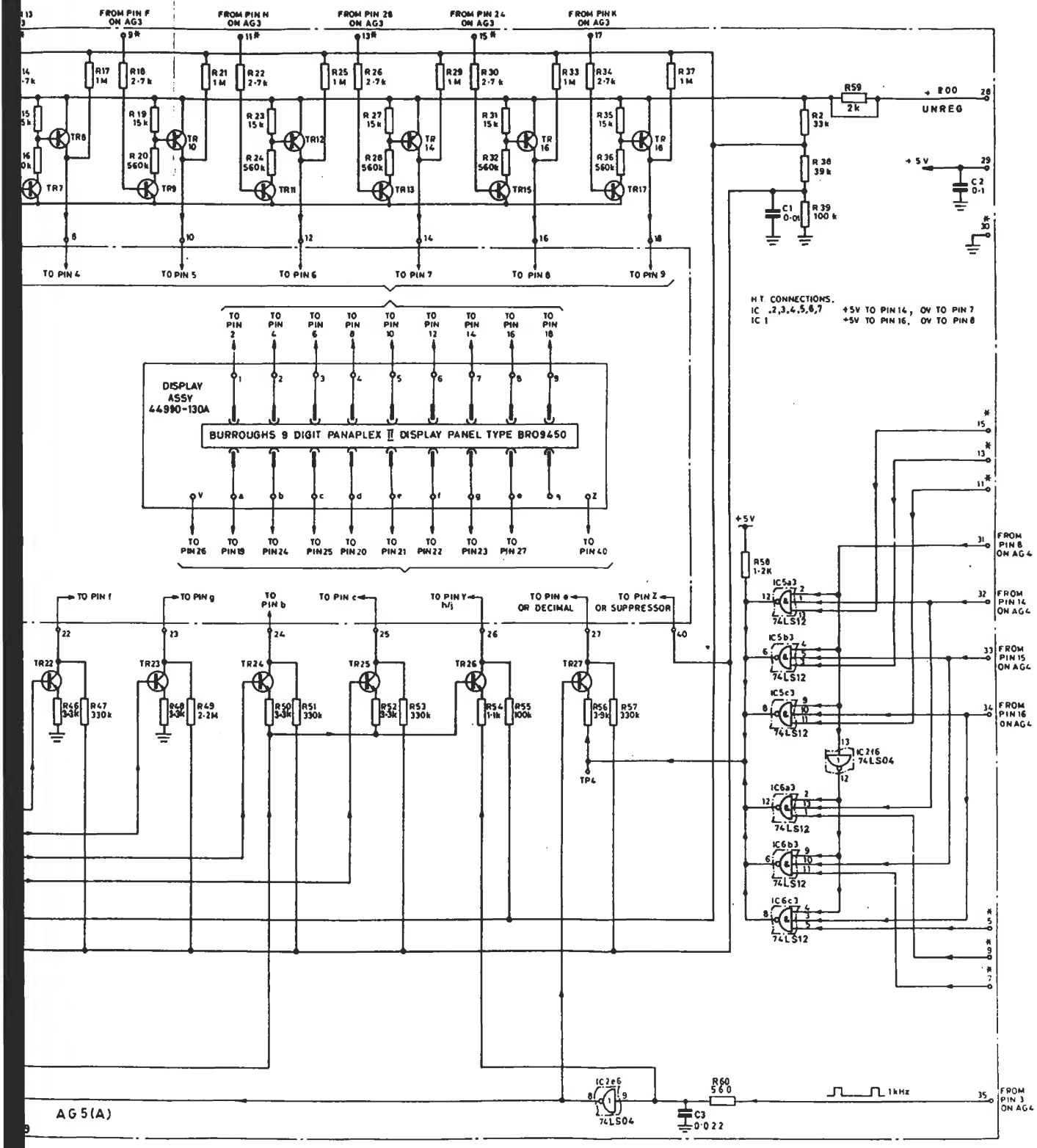


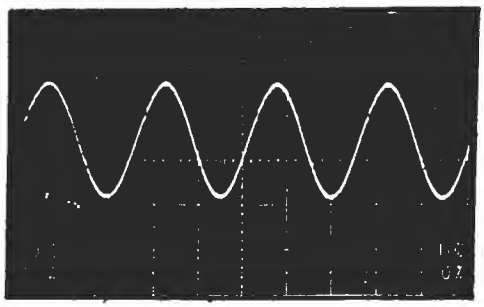
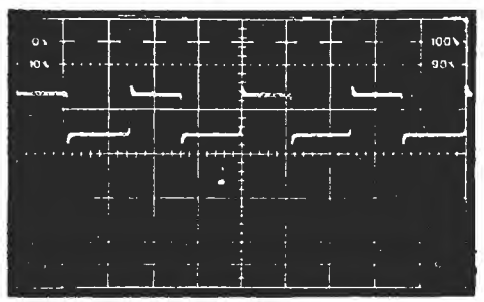
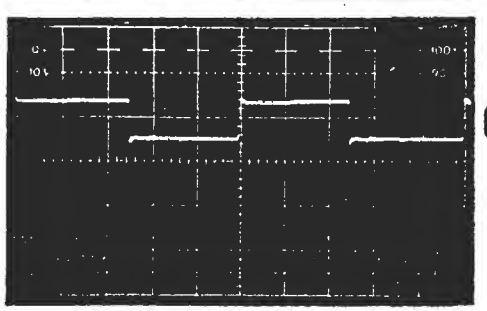
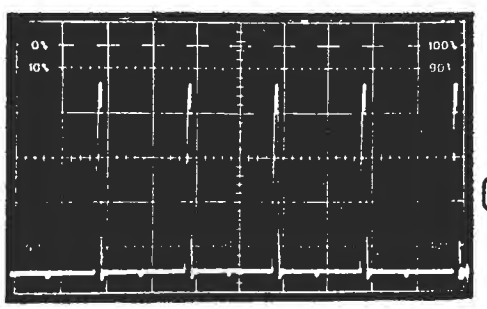
Fig. 7.28 Counter display AG5

Waveforms for AG1

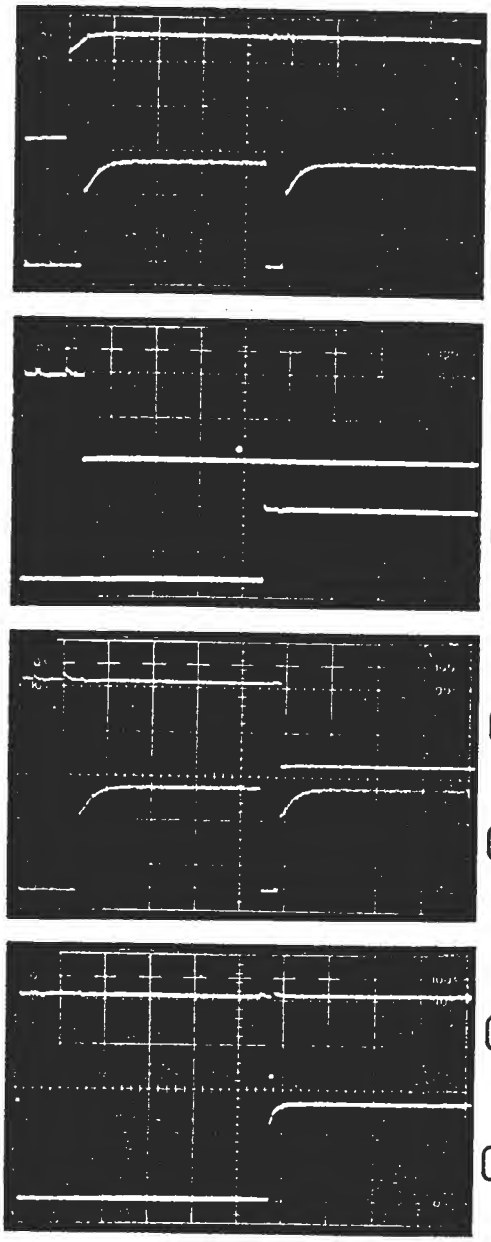
TF 2370 controls - SWEEP MODE : MANUAL
HORIZONTAL SCALE and RANGE : 5 MHz/DIV
FILTER BANDWIDTH : NORMAL
COUNTER FREQUENCY : (1) to (20) BRIGHT LINE
(21) to (24) DIFF

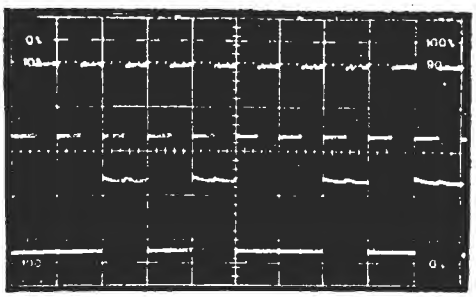
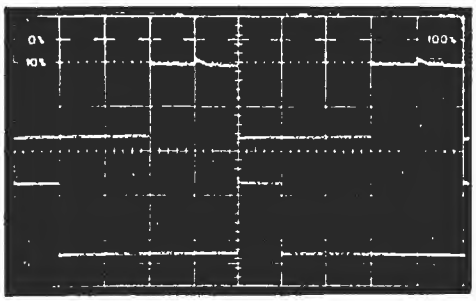
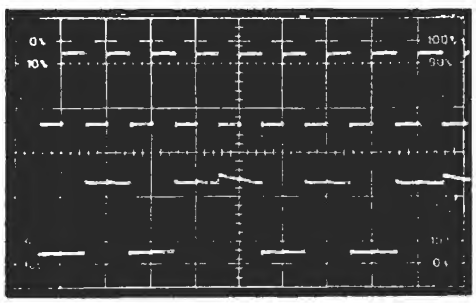
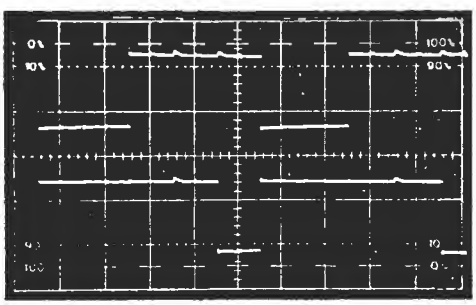
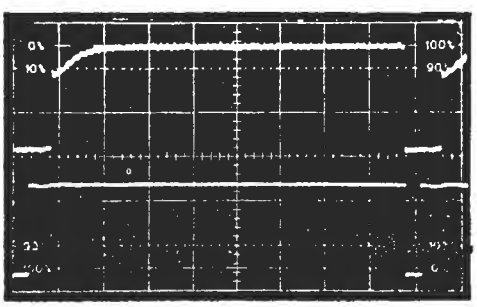
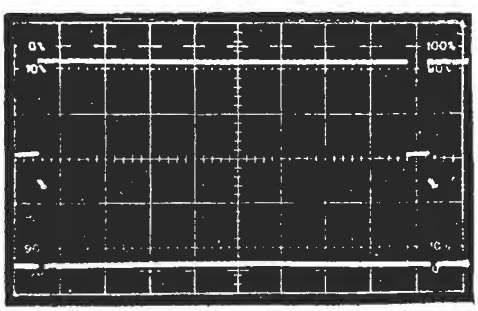
For (1) to (12), remove boards AE5 and AG4. Also adjust REFERENCE FREQ and/or BRIGHT LINE controls to obtain a 2 MHz signal at pin 1 of AG1. Disconnect the wire to pin 30 on AG1 and connect pin 5 on AG1 to earth. Momentarily connect to earth pin 15 of IC4 on AG1 for (5) to (8) and pin 4 of IC4 on AG1 (i.e. pin 30 on AG1) for (9) to (12).

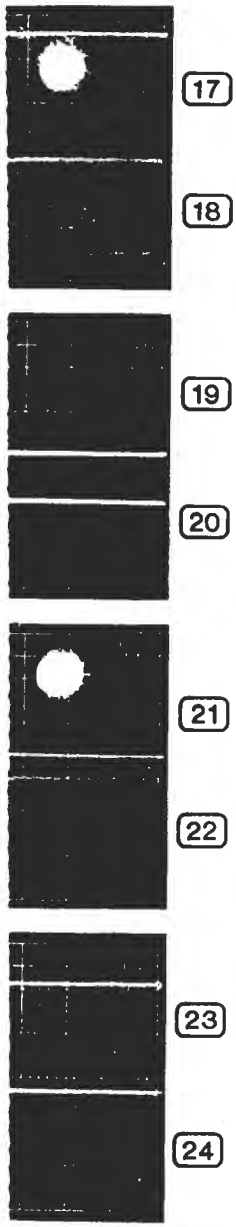
Oscilloscope triggering - (5) to (12) from pin 28 on AG1 (a.c. positive)
(13) to (16) from pin 9 on AG1 (a.c. negative)
(17) to (24) from pin 8 on AG1 (a.c. negative)

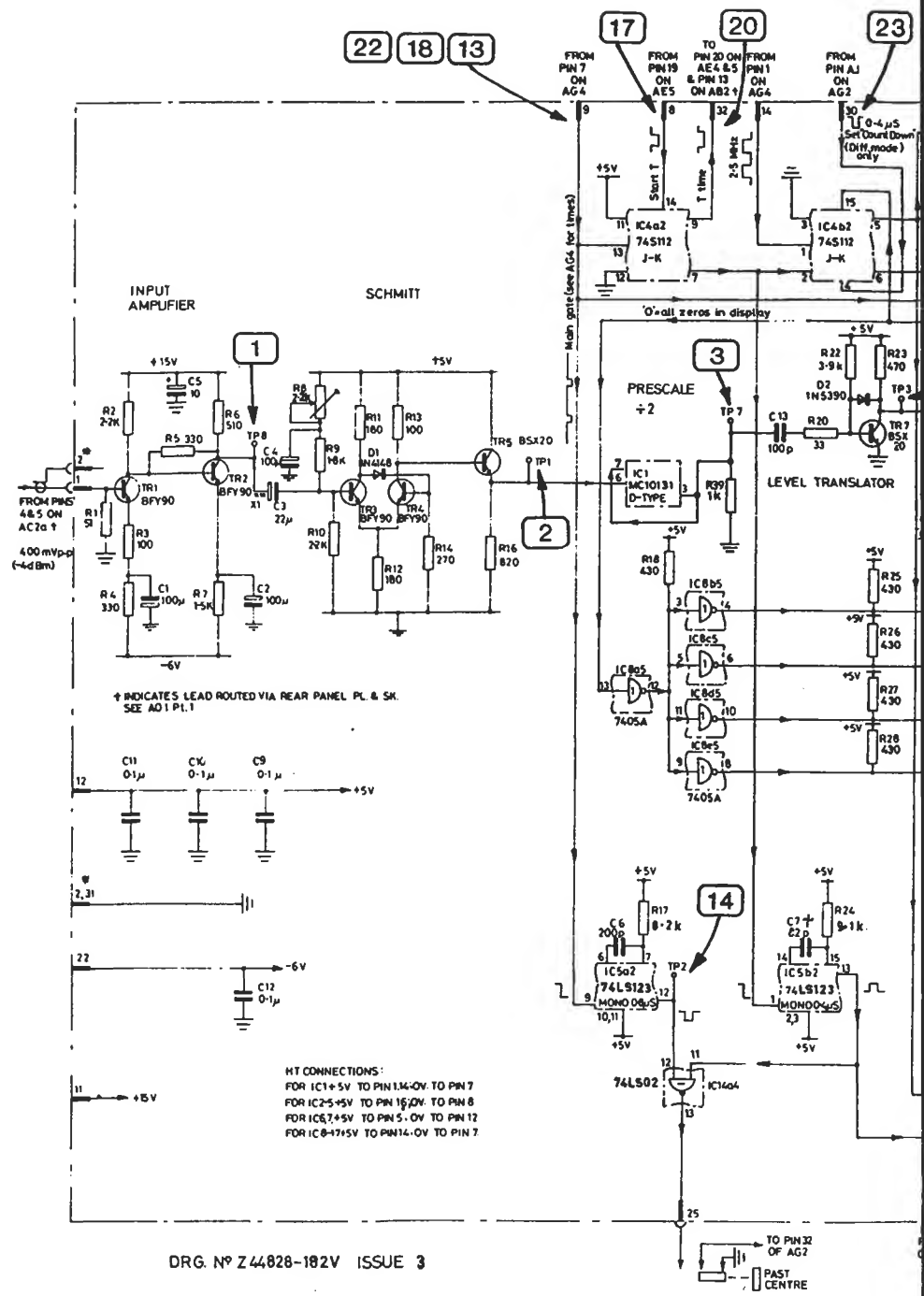
Horizontal scale	*Vertical scale*	*Datum level*	
			 1
0.2 μs/div	0.5 V/div	6 V →	
			 2
0.2 μs/div	1 V/div	0 V →	
			 3
0.2 μs/div	1 V/div	0 V →	
			 4
0.5 μs/div	1 V/div	0 V →	

5 μs/div	2 V/div	17
5 μs/div	2 V/div	18
5 μs/div	2 V/div	19
5 μs/div	2 V/div	20
5 μs/div	2 V/div	21
5 μs/div	2 V/div	22
5 μs/div	2 V/div	23
5 μs/div	2 V/div	24



2 µs/div	2 V/div		5
2 µs/div	2 V/div		6
2 µs/div	2 V/div		7
2 µs/div	2 V/div		8
2 µs/div	2 V/div		9
2 µs/div	2 V/div		10
2 µs/div	2 V/div		11
2 µs/div	2 V/div		12
2.5 µs/div	2 V/div		13
2.5 µs/div	2 V/div		14
2.5 µs/div	2 V/div		15
2.5 µs/div	2 V/div		16





DRG. Nº Z 44828-182V ISSUE 3

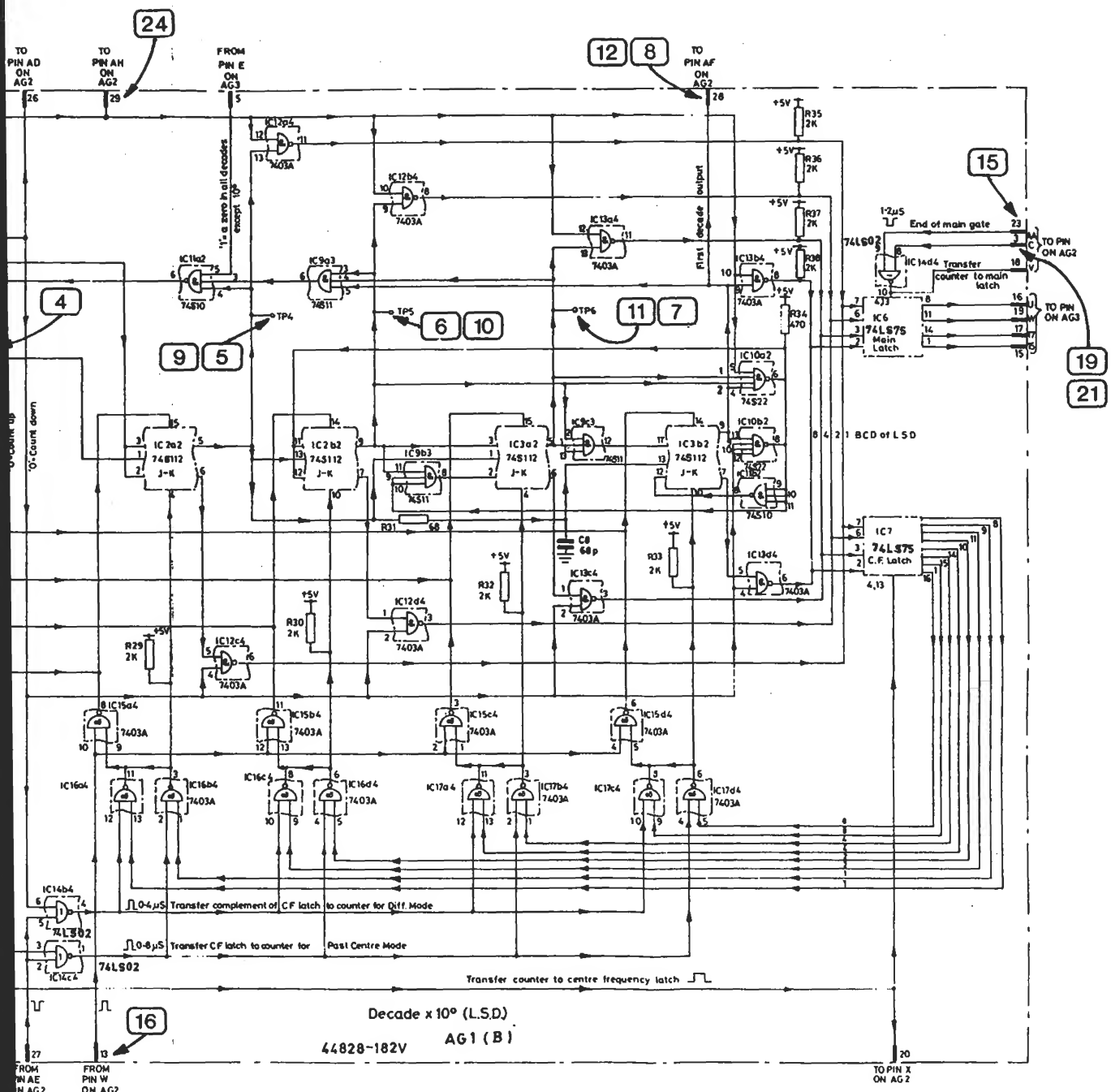
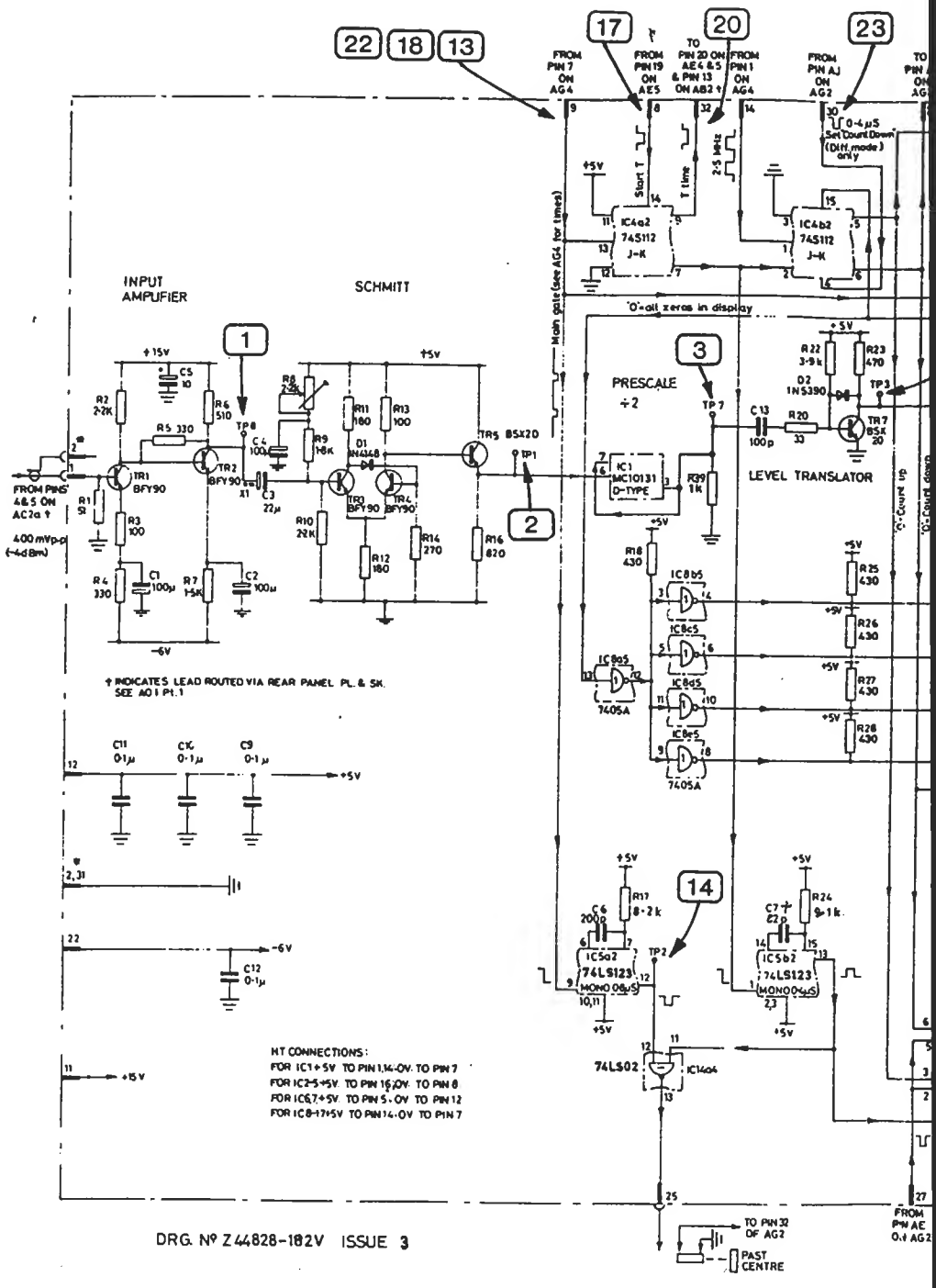


Fig. 7.29 Counter front end AG1



DRG. Nº Z44828-182V ISSUE 3

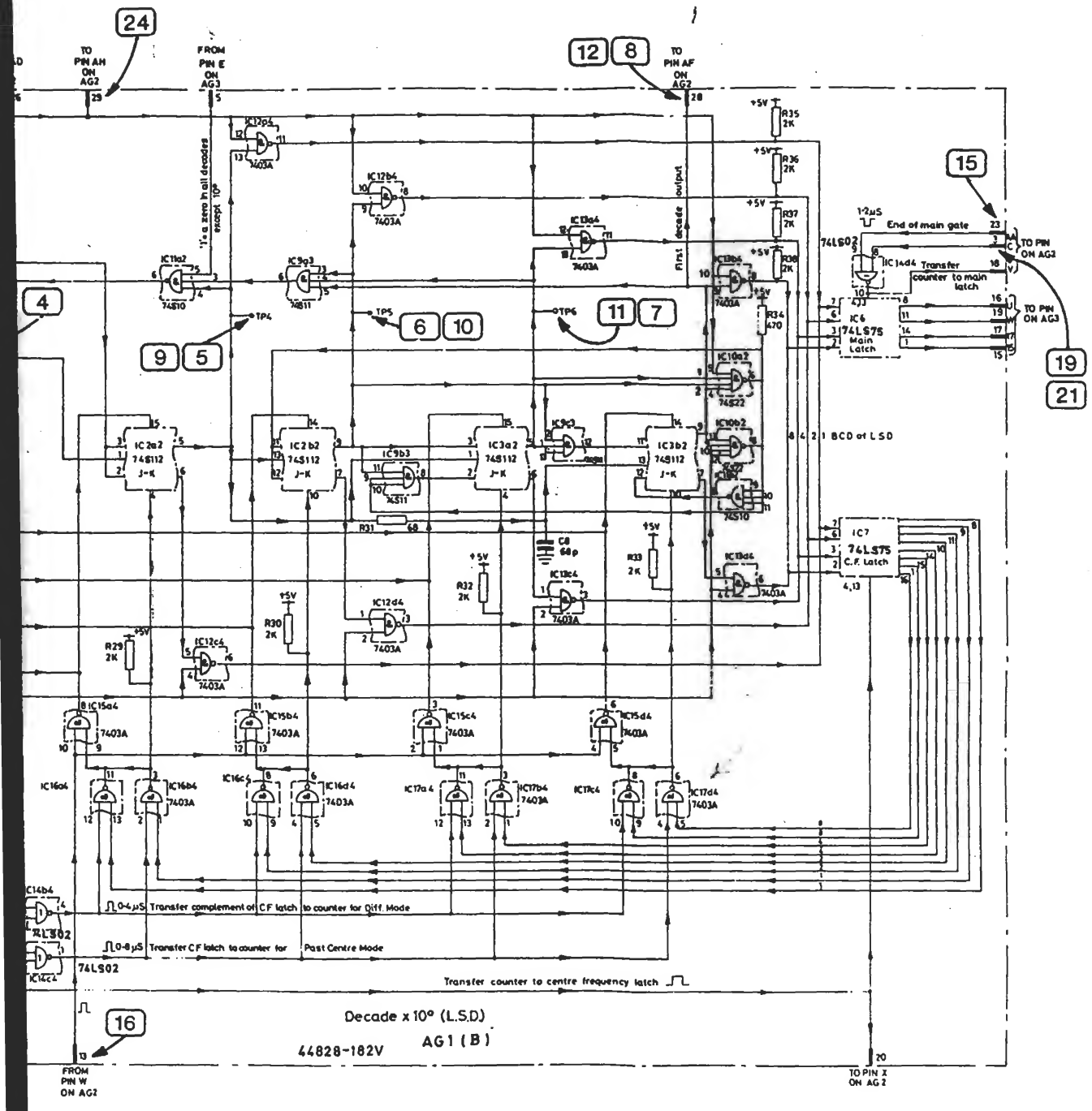
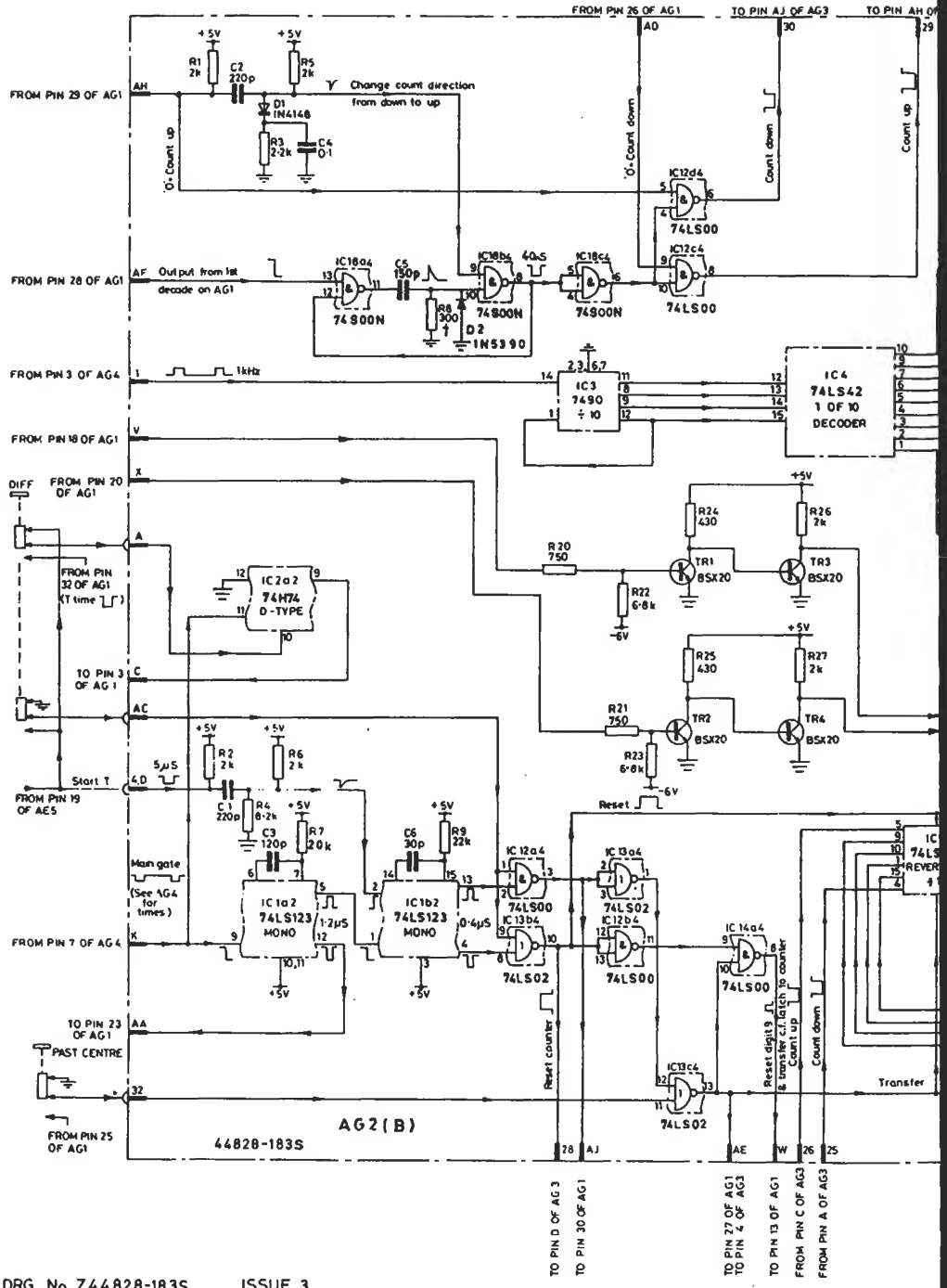


Fig. 7.29 Counter front end AG1



DRG No Z44828-183S ISSUE 3

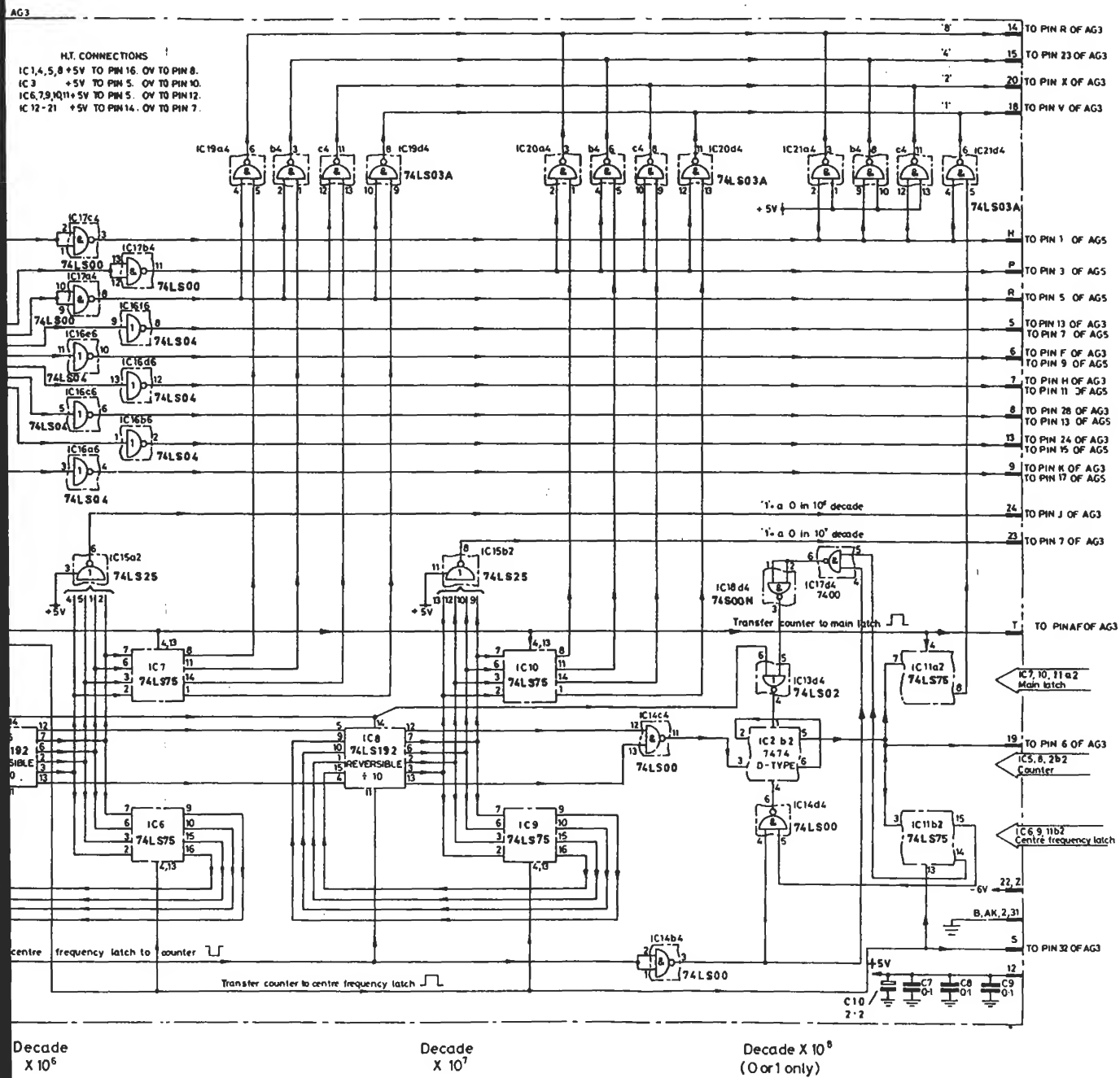
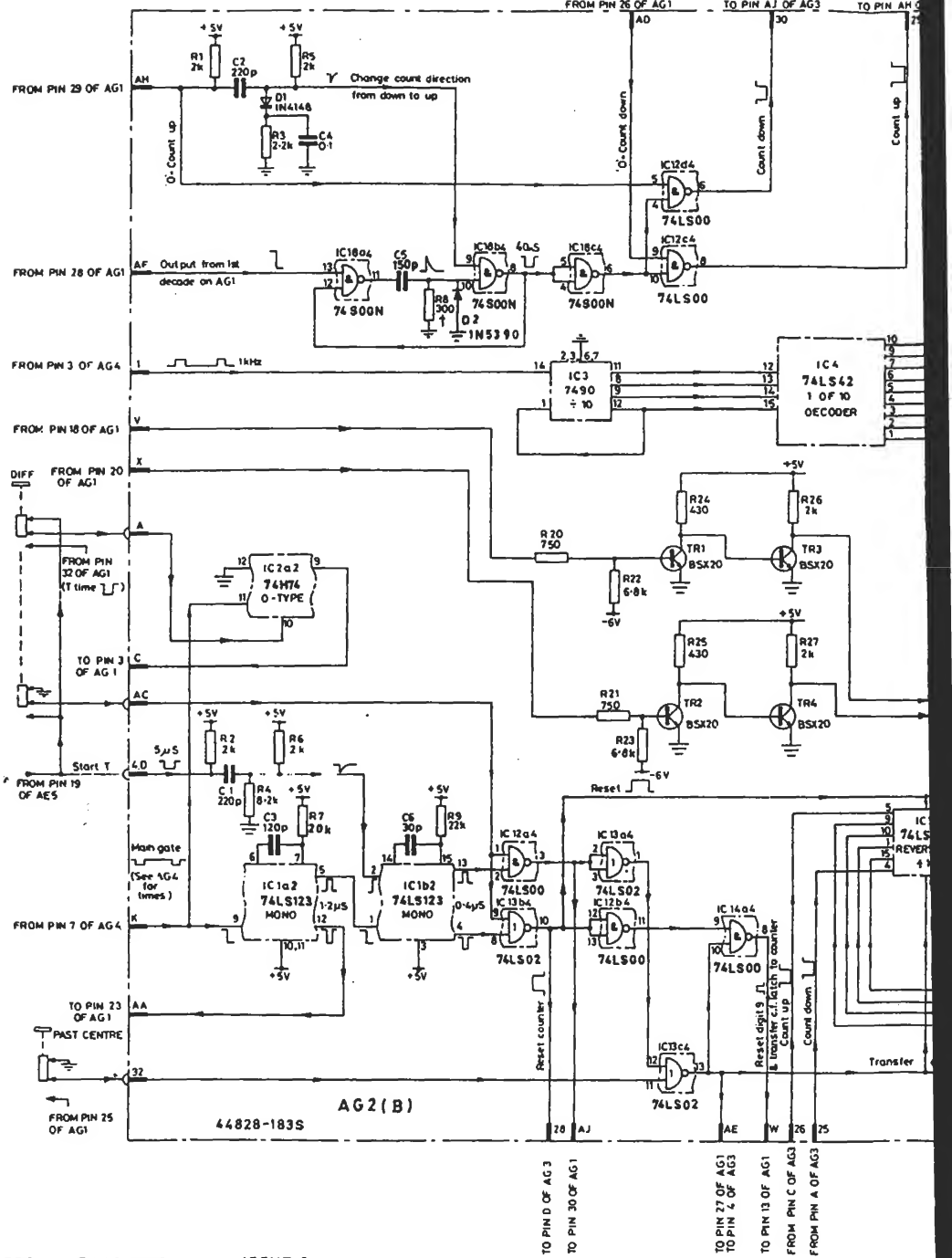


Fig. 7.30 Counter control and dividers AG2



DRG No Z44828-183S ISSUE 3

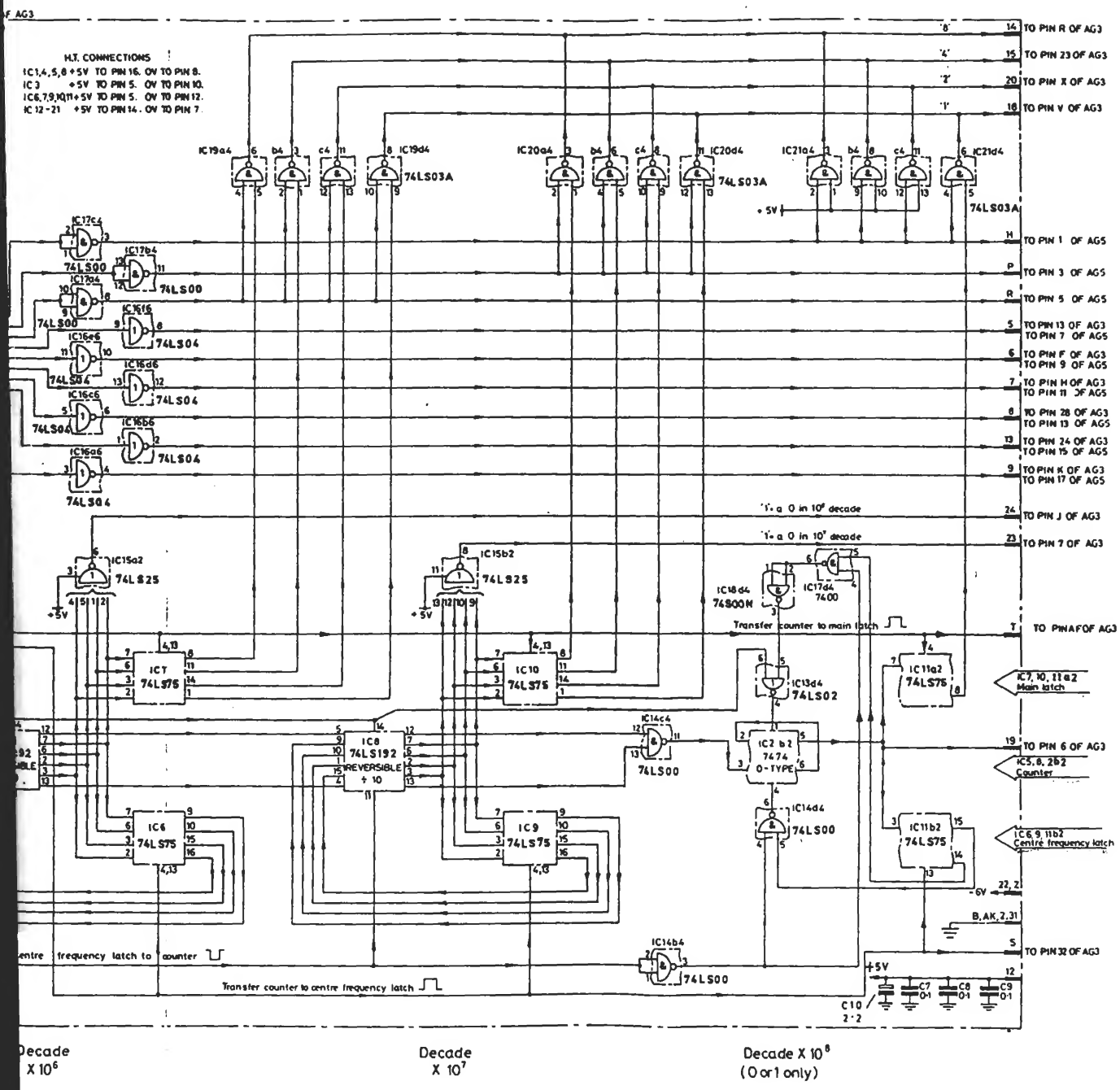
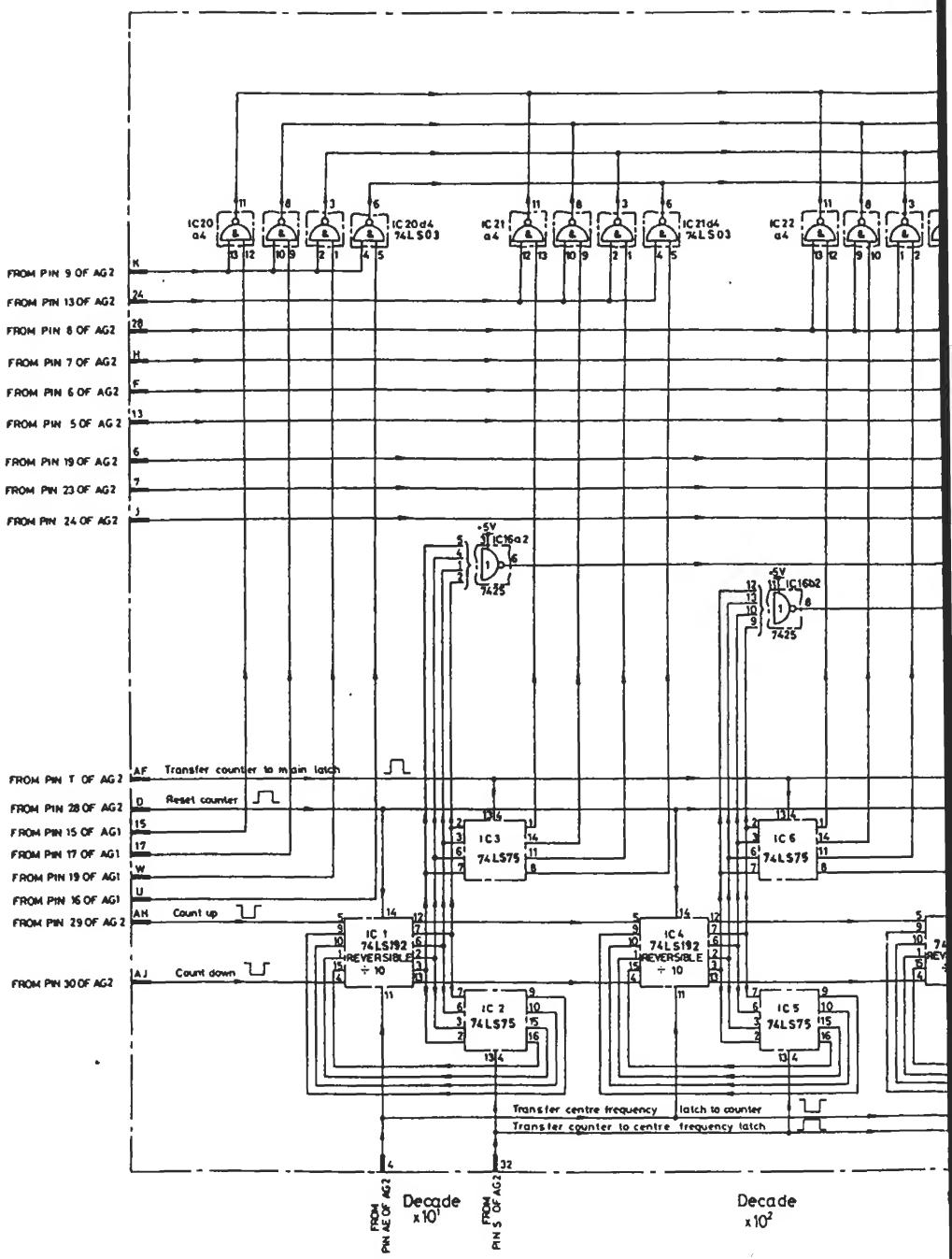
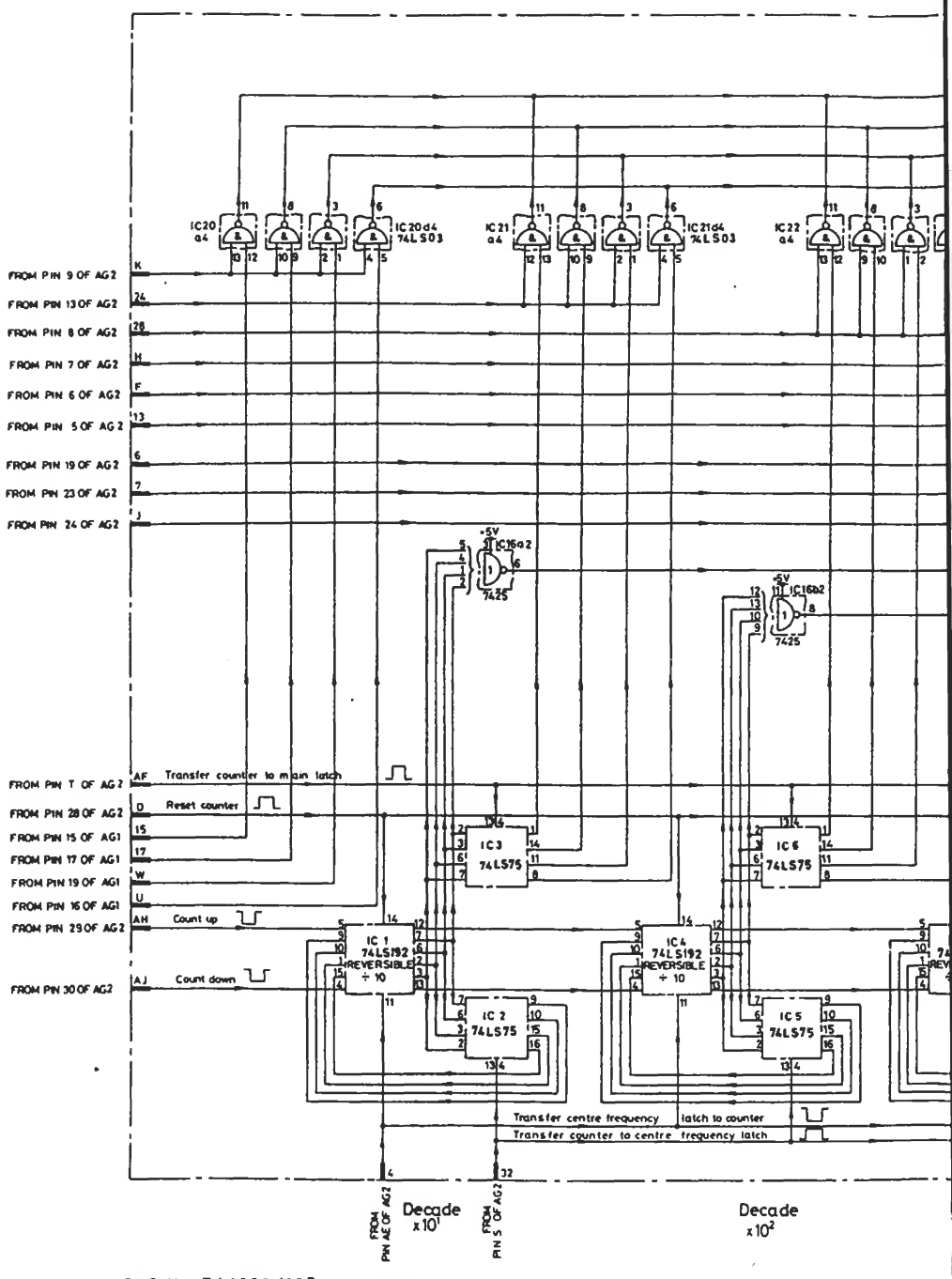


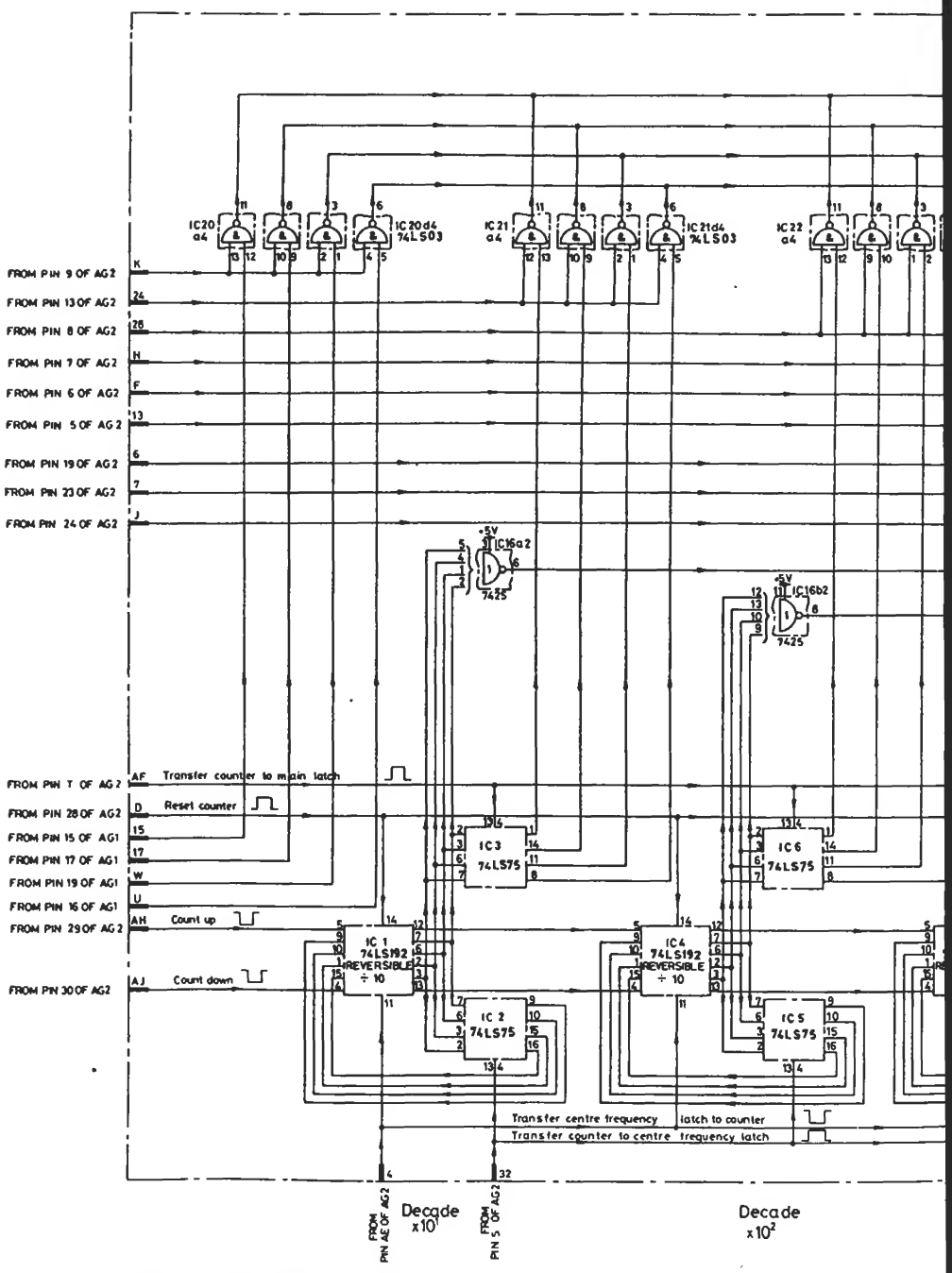
Fig. 7.30 Counter control and dividers AG2



DRG No. Z44828-118D ISSUE 2



DRG No. Z44828-118D ISSUE 2



DRG No. Z44828-118D ISSUE 2

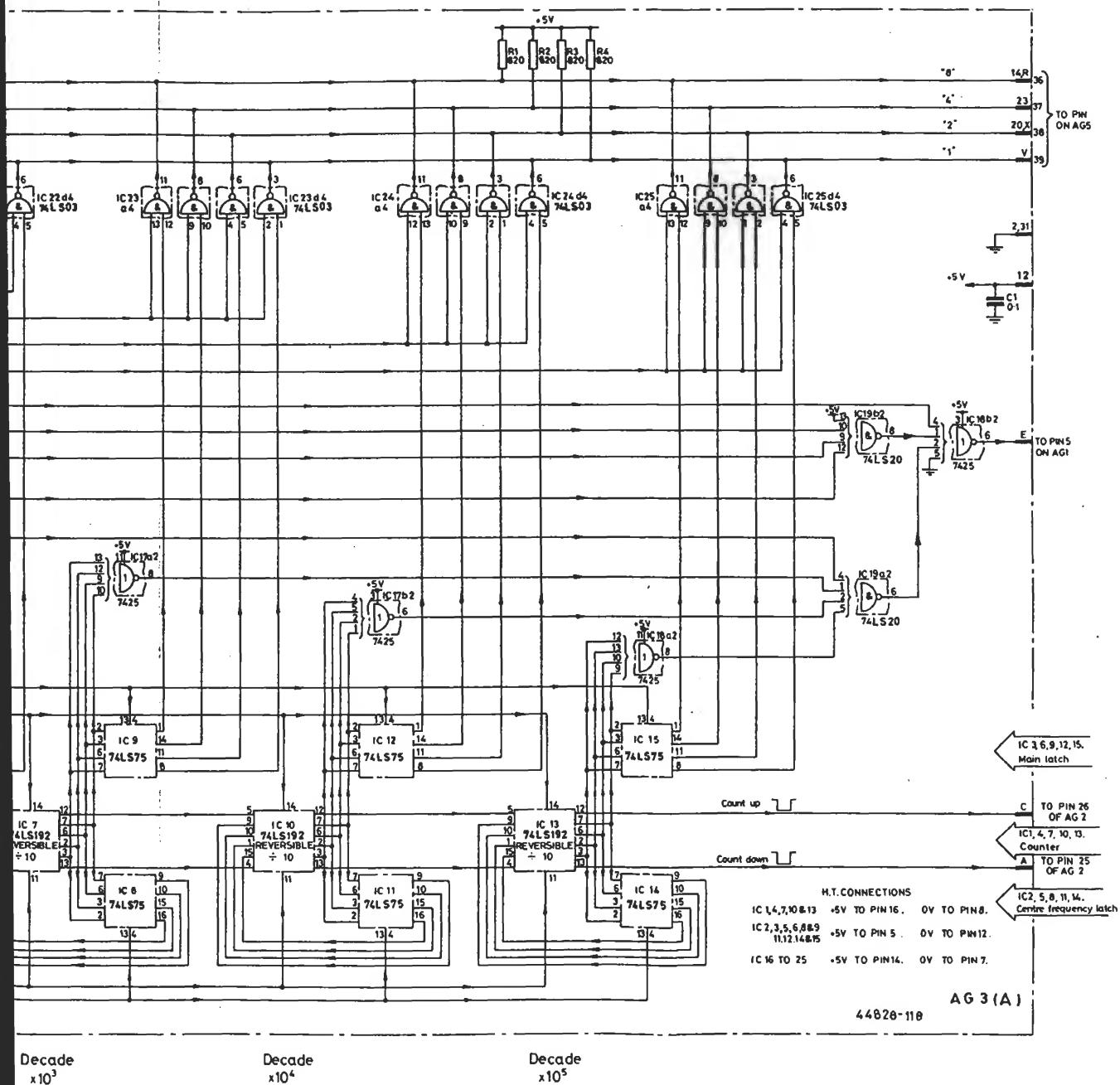
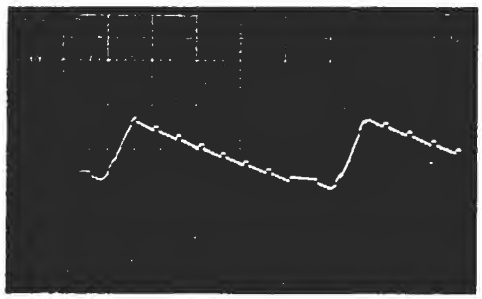


Fig. 7.31 Main divider chain AG3

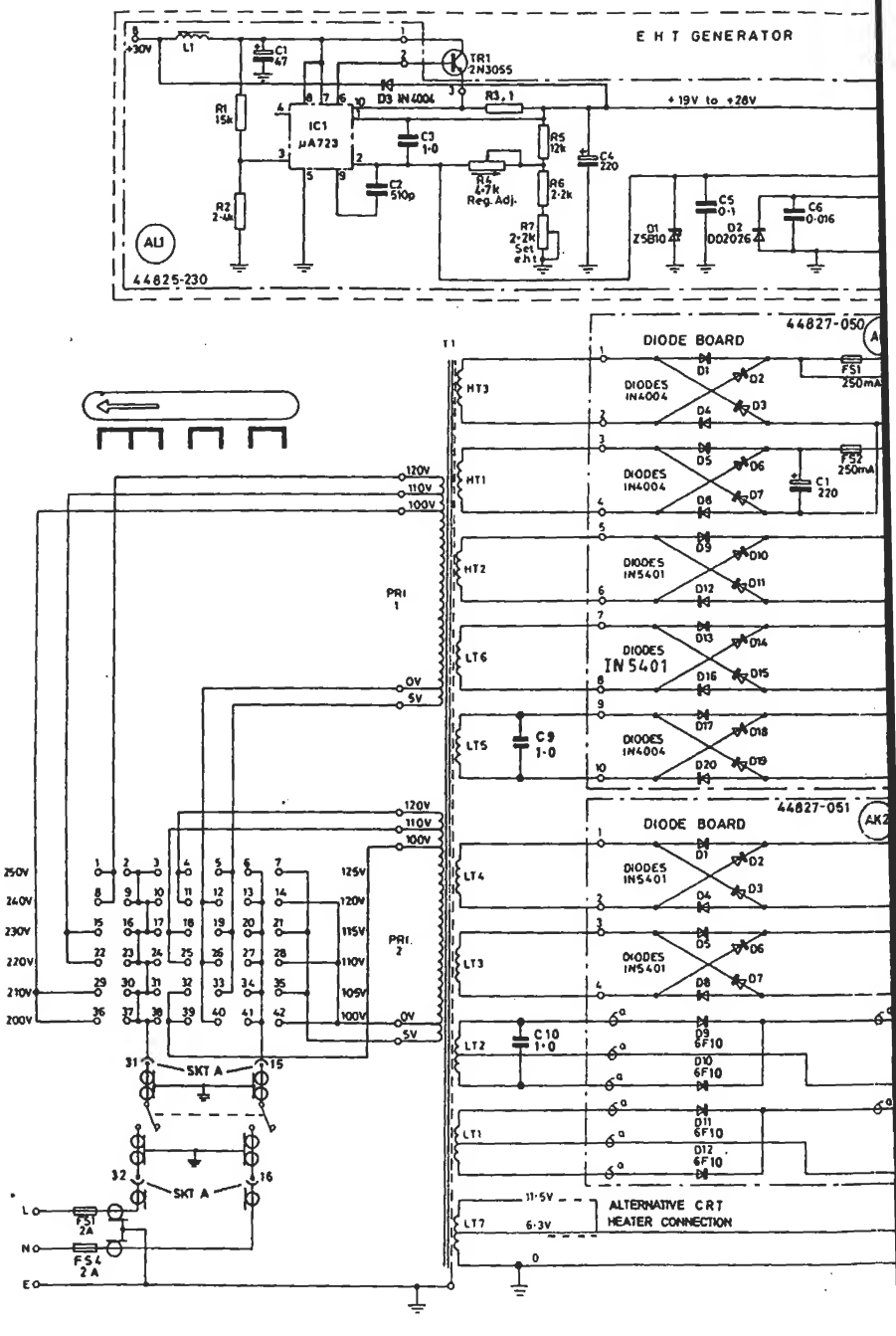
Waveforms for AK1

TF 2370 controls - COUNTER ON/OFF : ON
Feed the a.c. supply through a variable transformer and adjust the voltage to exactly that for which the voltage selection panel is set.

Horizontal scale	*Vertical scale*	*Datum level*
2 ms/div	0.5 V/div	197 V →



1



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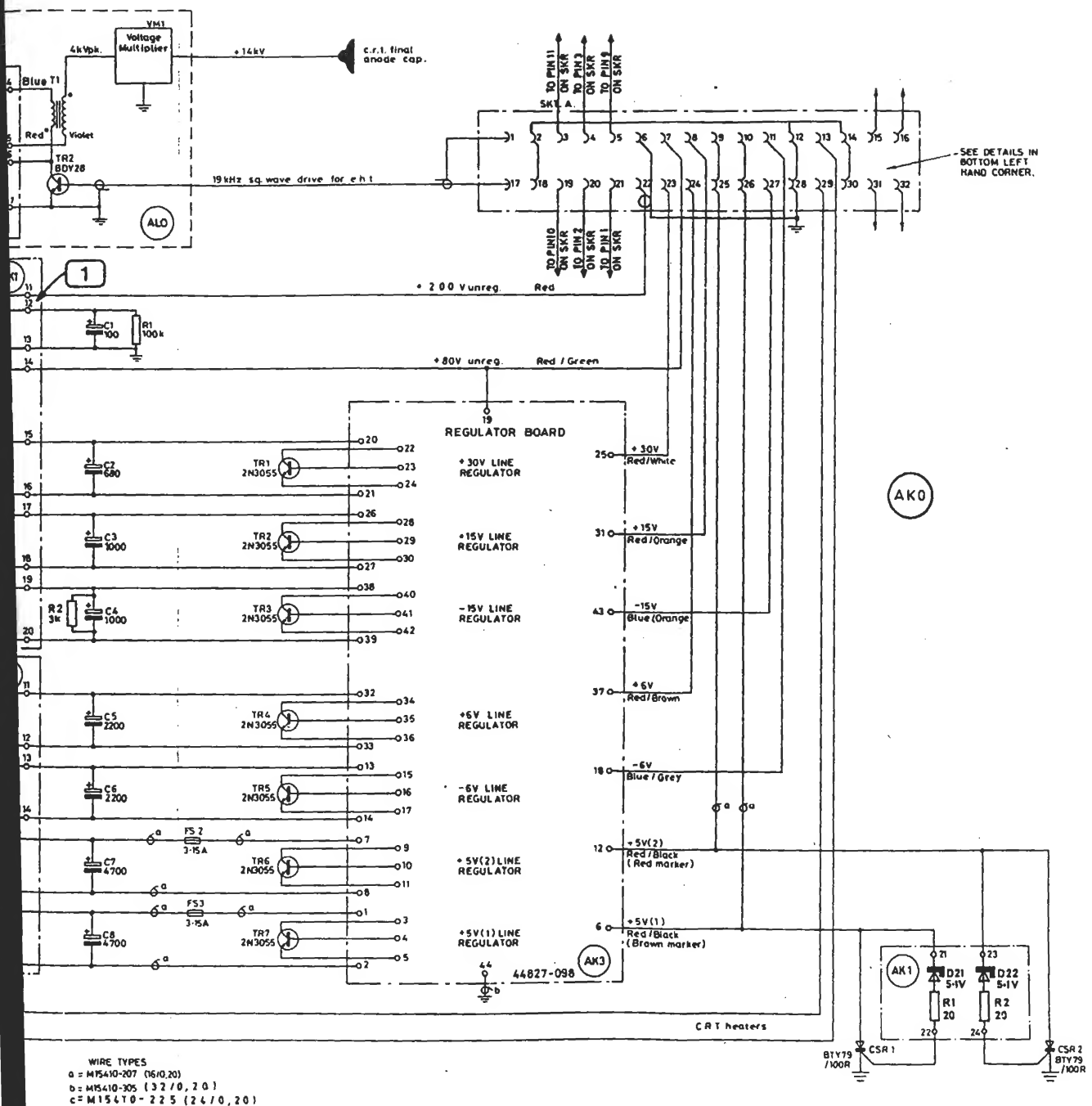
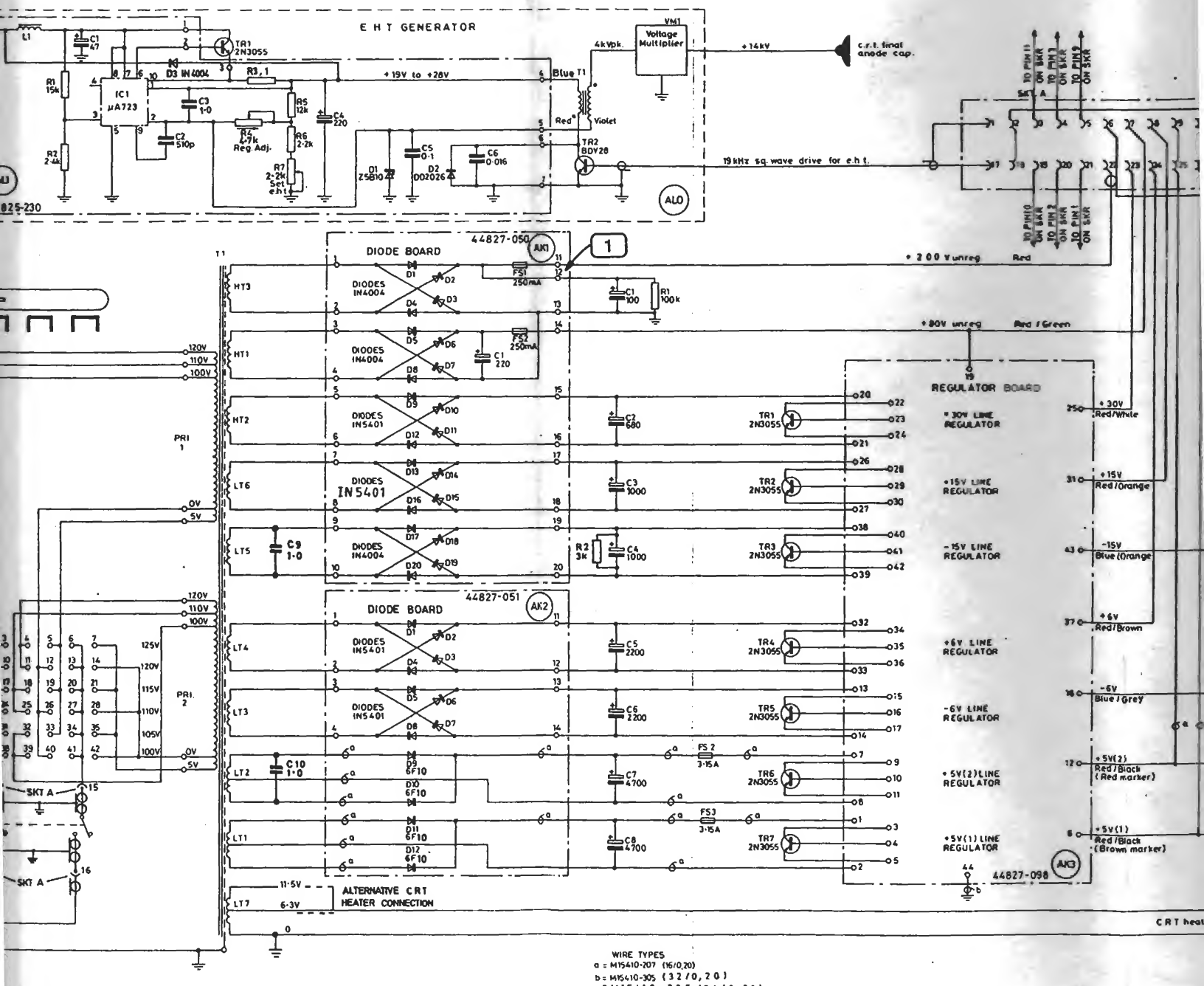


Fig. 7.32 Circuits: AK1, AK2, AK0, AL0 and AL1

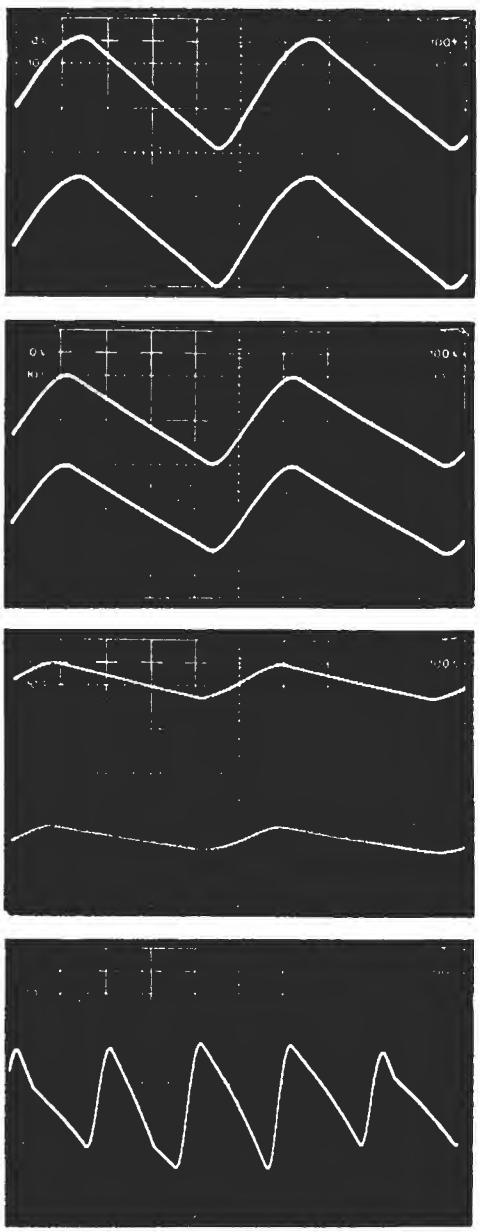


WIRE TYPES
a = M15410-207 (16/0,20)
b = M15410-305 (32/0,20)
c = M15410-225 (24/0,20)

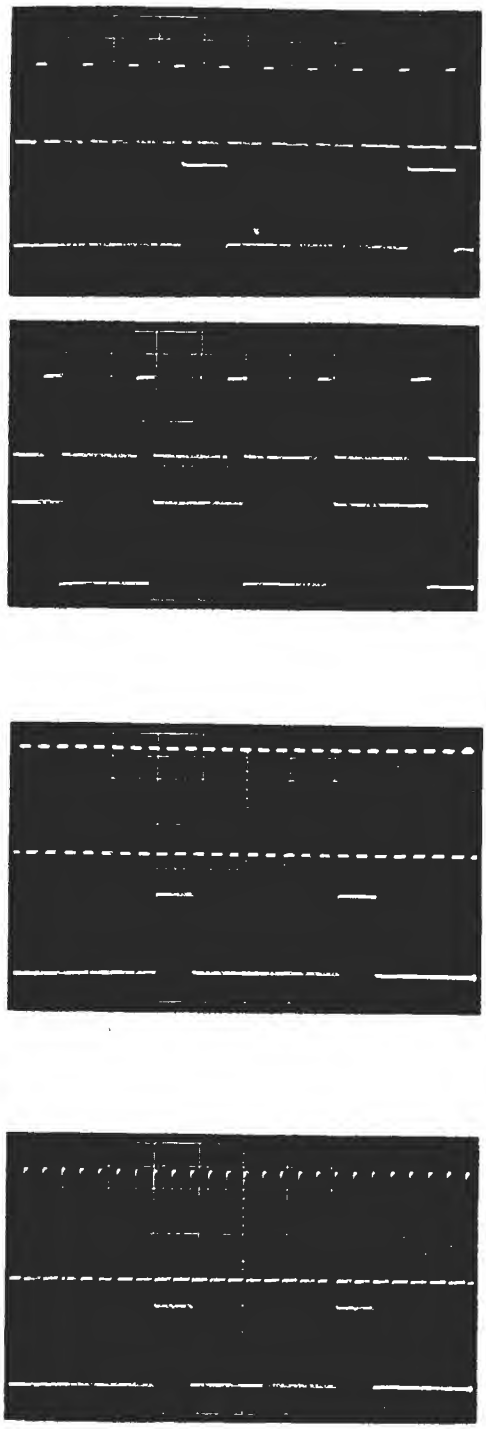
Waveforms for AK3

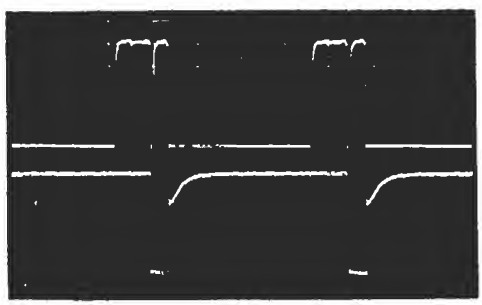
Feed the a.c. supply through a variable transformer and adjust the voltage to exactly that for which the voltage selection panel is set.

Horizontal scale	*Vertical scale*	*Datum level*	
2 ms/div	1 V/div	→	1
2 ms/div	1 V/div	10 V →	2
2 ms/div	1 V/div	5 V →	3
2 ms/div	1 V/div	11 V →	4
2 ms/div	5 V/div	15 V →	5
2 ms/div	5 V/div	0 V →	6
5 ms/div	2 V/div	40 V →	7



0.2 ms/div	2 V/div	8
0.2 ms/div	2 V/div	9
0.5 ms/div	2 V/div	10
0.5 ms/div	2 V/div	11
5 ms/div	2 V/div	12
50 ms/div		13
0.5 s/div		14
50 µs/div		15
0.5 ms/div		16
5 ms/div	2 V/div	17
50 ms/div		18
0.5 s/div		19
50 µs/div		20
0.5 ms/div		21
5 µs/div	2 V/div	22
10 µs/div	2 V/div	23



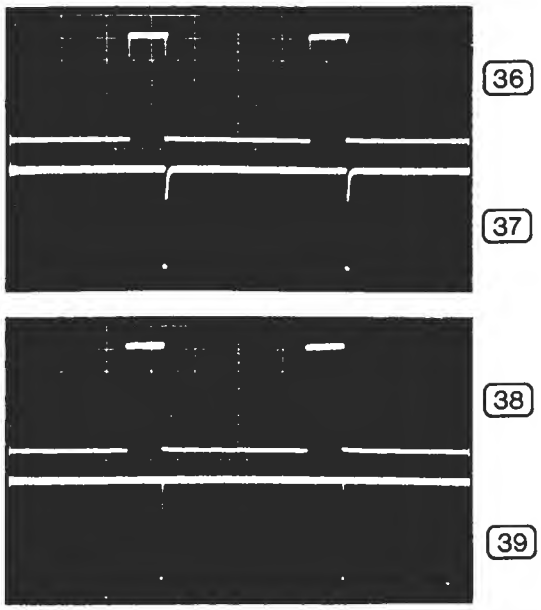
10 μs/div	2 V/div		24
10 μs/div	2 V/div		25
1 ms/div	2 V/div		26
1 ms/div	2 V/div		27
5 ms/div	2 V/div		28
5 ms/div	2 V/div		29
50 ms/div	2 V/div		30
50 ms/div	2 V/div		31
0.5 s/div	2 V/div		32
0.5 s/div	2 V/div		33
5 μs/div	2 V/div		34
5 μs/div	2 V/div		35

50 μs/div 2 V/div

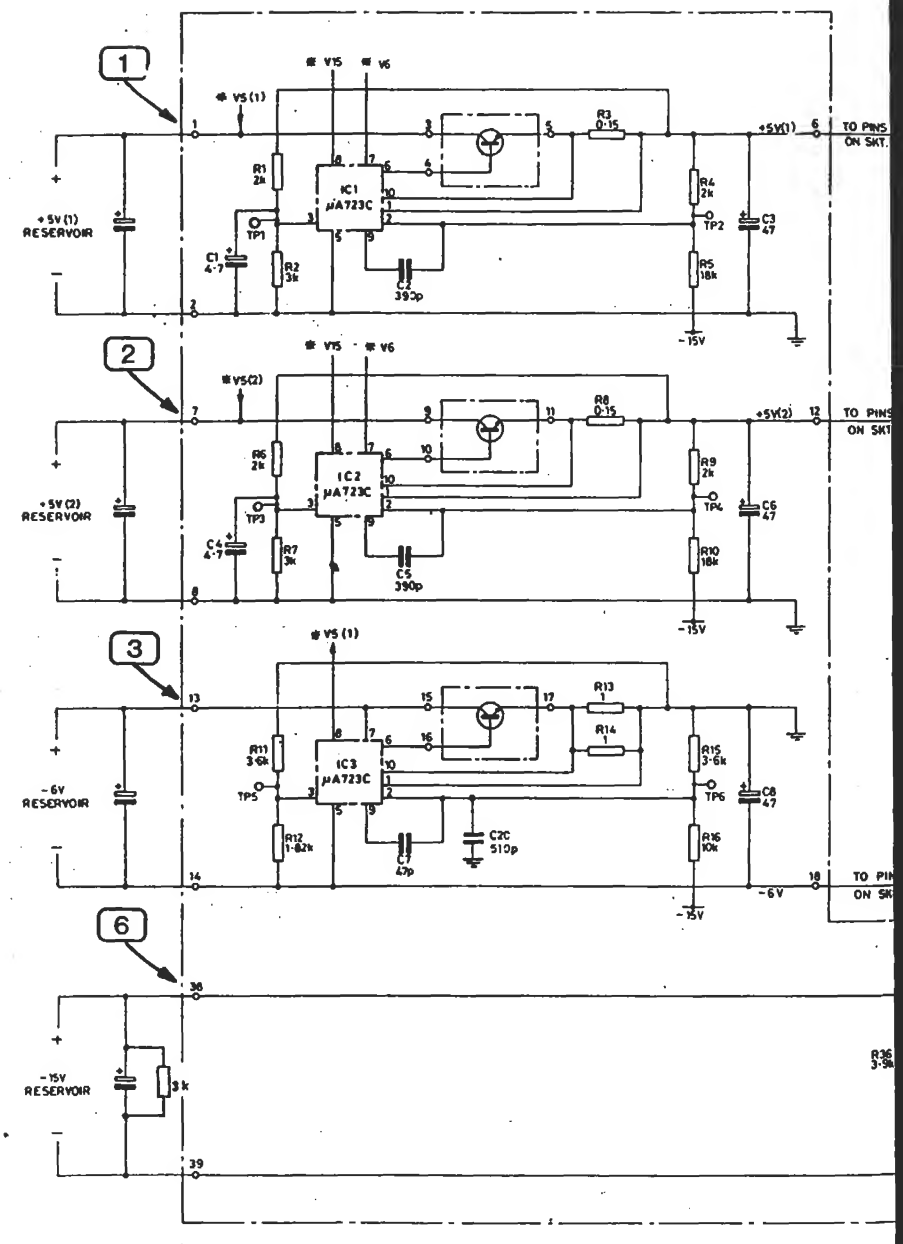
50 μs/div 2 V/div

0.5 ms/div 2 V/div

0.5 ms/div 2 V/div



SEE AKG CIRCUIT DIAGRAM



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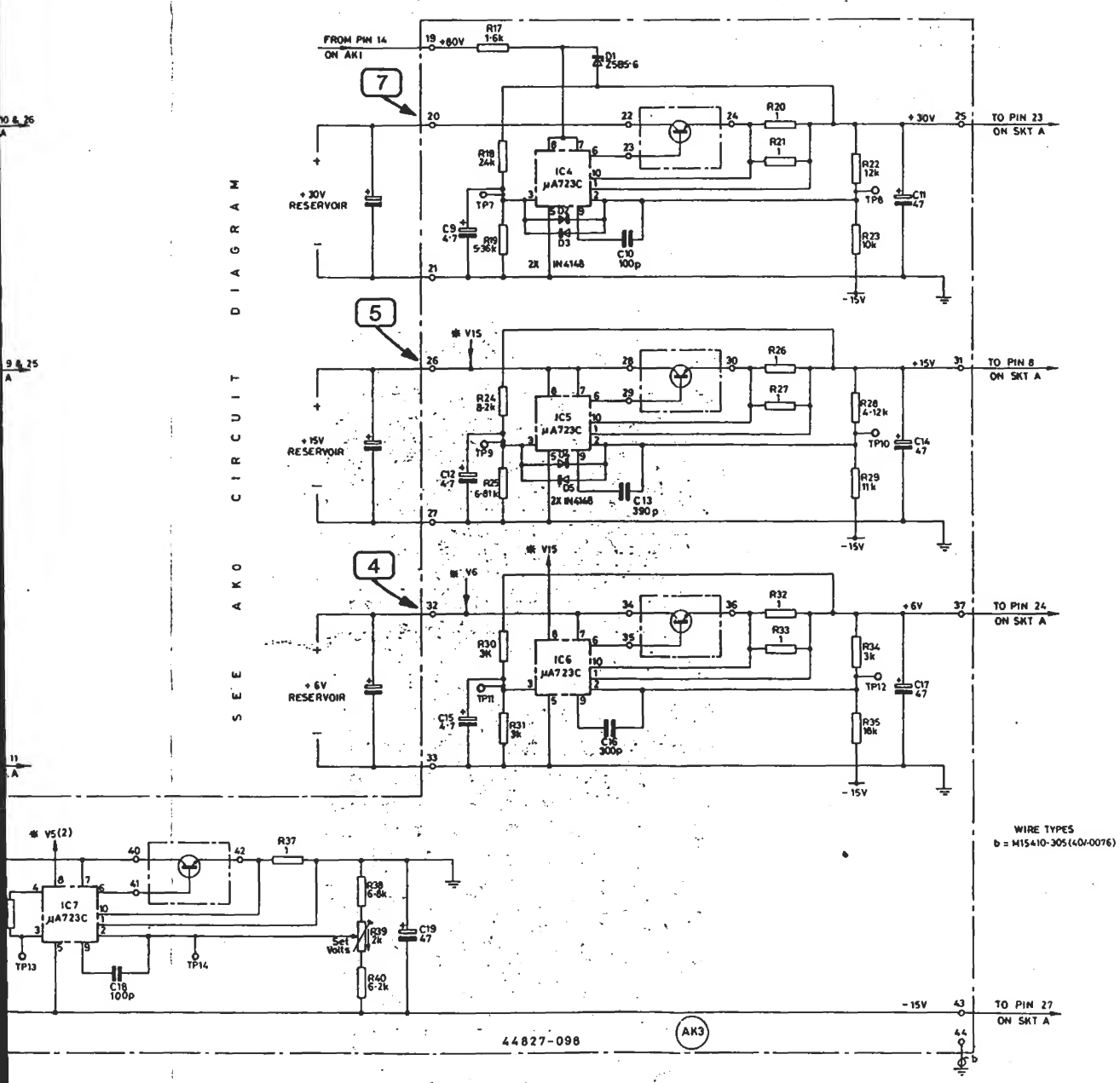
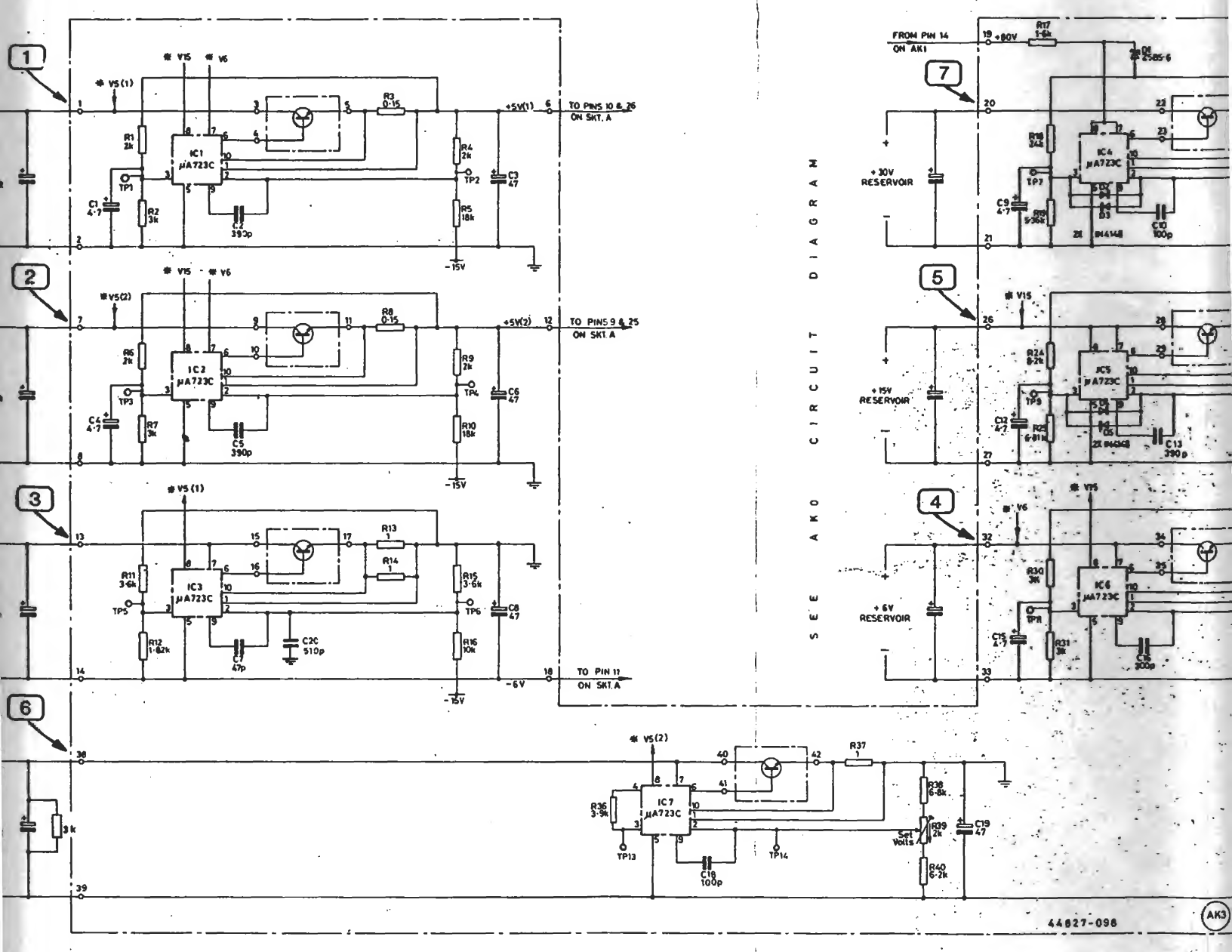
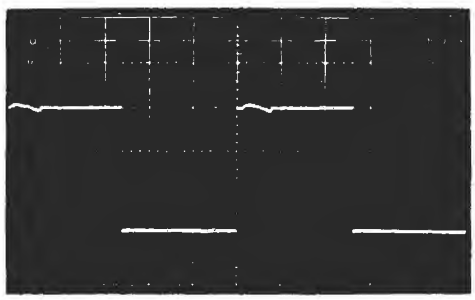
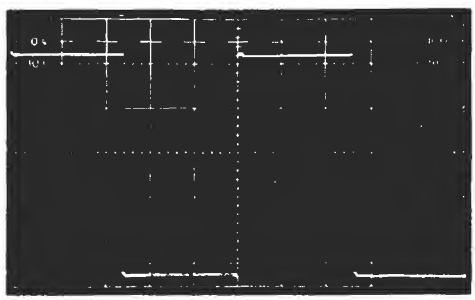
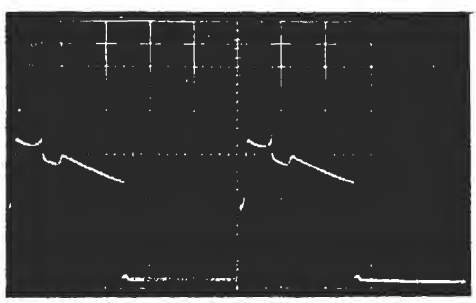
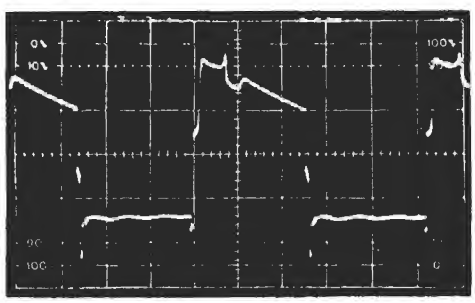


Fig. 7.33 Regulator AK3

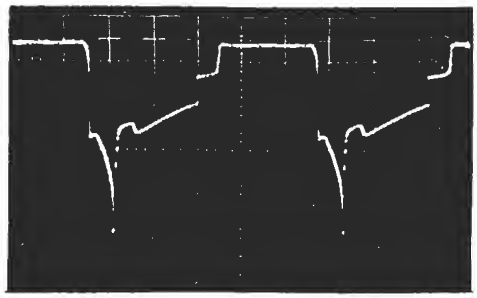

1
2
3
4
5
6
7
IC1 µA723C
IC2 µA723C
IC3 µA723C
IC4 µA723C
IC5 µA723C
IC6 µA723C
IC7 µA723C
TO PINS 10 & 26 ON SKT. A
TO PINS 9 & 25 ON SKT. A
TO PIN 11 ON SKT. A
FROM PIN 14 ON AK1
+30V RESERVOIR
+15V RESERVOIR
+6V RESERVOIR
-15V
-6V
+5V(1)
+5V(2)
Set Volts
SEE AKO CIRCUIT DIAGRAM
44827-098
AK3

Waveforms for AM1, AM2 and AM3

TF 2370 controls - SWEEP MODE : SINGLE
HORIZONTAL SCALE and RANGE : 10 MHz/DIV
FILTER BANDWIDTH : NARROW
REFERENCE FREQUENCY 0-110 MHz : Fully counter-clockwise
BRIGHT LINE POSITION : (9) and (11) So that the bright line is obscured behind the centre dashed frequency graticule line.
VERTICAL SCALE RANGE : 10 dB/DIV
STORE and DISPLAY : HIGH DEFN
GRATICULE INTENSITY : (8) to (12) Normal contrast so that the waveform amplitude is as shown.

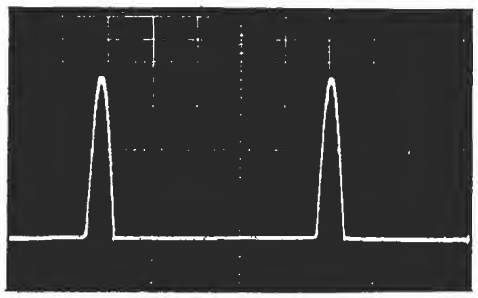
Horizontal scale	*Vertical scale*	*Datum level*	
10 μs/div	1 V/div	0 V →	 1
10 μs/div	1 V/div	0 V →	 2
10 μs/div	20 V/div	0 V →	 3
10 μs/div	2 V/div	0 V →	 4

10 μs/div 2 V/div 0 V →



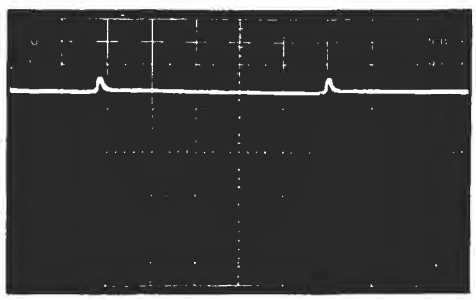
5

10 μs/div 100 V/div 0 V →



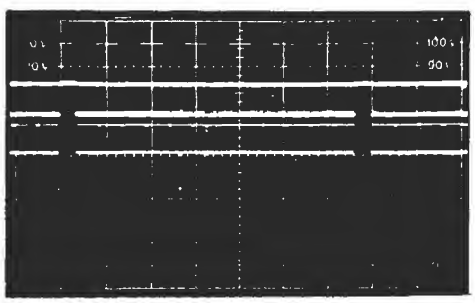
6

10 μs/div 100 V/div 0 V →



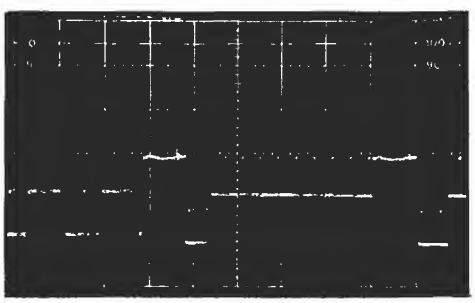
7

2 ms/div 0.5 V/div 14 V →



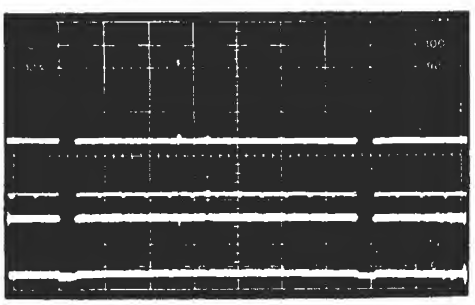
8

10 μs/div 0.5 V/div 14 V →

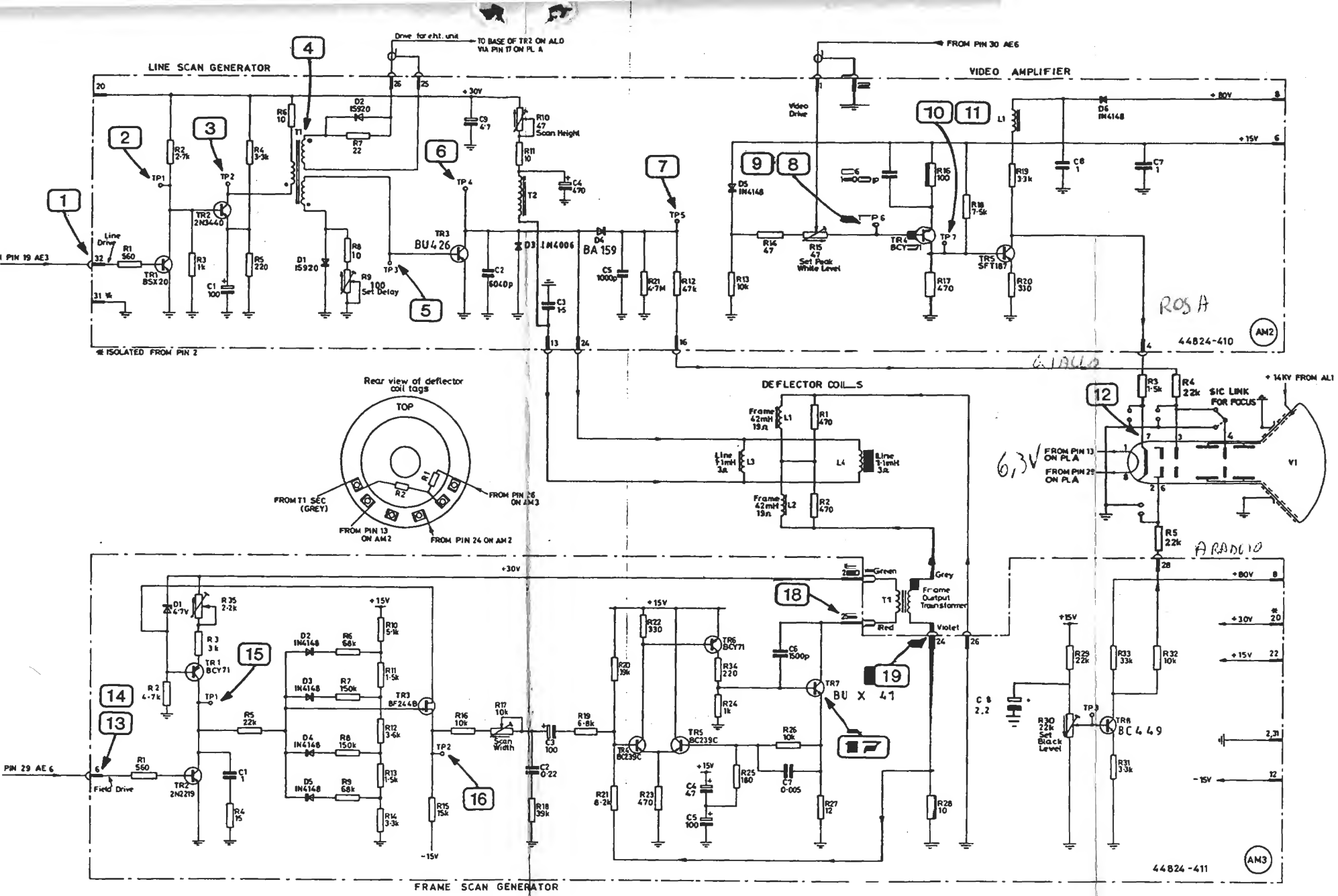


9

2 ms/div 1 V/div 3 V →



10



FIL MARR
FIL ROS

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